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REVISION OF THE COCCOID MYXOPHYCEAE

by

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and

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TO
DONALD RICHARDS
AND
FAY KENOYER DAILY

WITHOUT WHOSE ASSISTANCE AND CONSTANT ENCOURAGEMENT
THIS STUDY COULD NOT HAVE BEEN THUS FAR ADVANCED
AND THIS VOLUME COULD NOT HAVE BEEN COMPLETED

REVISION OF THE COCCOID MYXOPHYCEAE

Francis Drouet and William A. Daily

	PAGE
HISTORY OF CLASSIFICATION	3
MORPHOLOGY	5
PRESERVATION AND MICROSCOPICAL TECHNIQUES	8
LOCATION OF SPECIMENS AND ACKNOWLEDGMENTS	9
FAMILY I. CHROOCOCCACEAE	11
FAMILY II. CHAMAESIPHONACEAE	100
FAMILY III. CLASTIDIACEAE	134
NOMINA EXCLUDENDA	136
ILLUSTRATIONS	167
ADDITIONS AND CORRECTIONS	191
INDEX	193

This study originated as an inquiry, some twenty years ago, into what names should be employed for species of coccoid Myxophyceae found in general collections of algae from various parts of the world. Gradually we accumulated and examined many thousands of specimens. Equally gradually it became apparent to us that only a carefully executed revision of the group, with sufficient attention paid to the morphological variation and life history of each species and with strict adherence to the stern discipline of the science of historical taxonomy, would produce a classification and a nomenclature which would satisfy our desire.

Our method consisted essentially of studying and re-studying every specimen which we could collect, borrow, purchase, or otherwise secure. Among these specimens were included the original material of many species described by various authors. During the latter years we made an ambitious attempt to find the original specimens of as many previously described species as possible. With funds provided by Mr. E. J. Richards of Chicago, a search was made in the larger European herbaria for such historical specimens. The nomenclature, synonymy, descriptions, notes, *nomina excludenda*, and photographs in the treatment of genera and species below record the results of this work.

It early became apparent that the various species are of very broad distribution in appropriate habitats over most of the earth. Our interpretations of their morphology and life histories were (and perhaps still are to a certain extent) often qualified by prejudices learned from previous classifications, and it has required considerable audacity to recognize such now readily apparent phenomena as the properties of the sheath material to be-

come hydrolyzed and to develop pigments which change color easily. It was a difficult admission finally to note hyelloid filaments at the bases of the cushions of *Entophysalis*, although it had been wholly natural to see entophysaloid cushions at the surface of plants of *Hyella*. We came to realize the fact that big plants grow from little plants and that (in our time) all plants come from other plants. In this group where the cells differentiate no hard parts, it became reasonable to expect that no two plants, each with a separate history of growth in separate environments, could look exactly alike; the same had to be admitted for each cell of each plant. In every microenvironment there occur at times catastrophic events (freezing, thawing, inundation, drying, heating, intense insolation, shading, parasitization, depredation by animals, changes in chemical nature of the substratum or medium, etc.) peculiar to its small area; it finally became apparent that these events often cause radical changes in the appearance and mode of growth of both plants and cells. The classification outlined here attempts to take these matters into consideration.

Over a thousand species, varieties and forms have been described within, or at one time or another transferred into, this group of plants. Authors of these taxa published before 1935, when the type method was incorporated into the International Rules of Nomenclature, did not, except in rare instances, indicate type specimens; and almost as seldom since 1935 have authors of novelties in microscopic algae designated types. It has therefore been a major task of this project for us to select type specimens for all specific and subspecific taxa previously untypified. In making such selections, we have wherever possible chosen the material originally studied by the authors; if such material were not found, then a specimen named later or reasonably assumed to have been seen by the author has been designated as the type.

There are perhaps numerous species for which no original specimens were preserved. The number of these is probably far less than this paper indicates, since we have been somewhat restricted in time, in patience, in assistance, and in financial, political, and psychological means to search out and examine the historical bases for all such species. For the purpose of completeness, we are designating the original descriptions of these species as temporary types (to serve until original specimens may be found); and these descriptions have been interpreted by us with some sense of responsibility in special lists of synonymy under the appropriate taxa. Descriptions (even with illustrations) are of course only ink and paper, not algae; the application of iodine to them will not indicate what to the taxonomist will be of primary concern: whether or not the cells of the new taxon contain starch. Especially of the algae are descriptions and illustrations matters of personal interpretation. It would be eminently unscientific of us and unfair

to the author if we presumed to comprehend fully a description without seeing the original specimen also. We have concluded that names of species with only descriptions and illustrations for types cannot be employed as names for taxa of algae in nature.

HISTORY OF CLASSIFICATION

If botanists prior to 1777 encountered species of coccoid Myxophyceae, they probably referred them to the Linnaean genera *Byssus*, *Tremella*, or *Ulva*. J. Lightfoot in his *Flora Scotica* (1777) named a conspicuous gelatinous alga from wet places on the Isle of Skye *Ulva montana* [*Anacystis montana* of this paper]. K. Sprengel in *Flora Halensis, Mantissa* (1807) described green globules floating in a lake near Halle as *Coccochloris stagnina*. During the period 1790—1850, numerous genera and species were published by J. B. Bory de St. Vincent, C. A. Agardh, H. C. Lyngbye, J. P. Vaucher, C. Sommerfelt, S. F. Gray, H. F. Link, C. G. Ehrenberg, A. J. C. Corda, R. K. Greville, E. Fries, P. J. Turpin, B. Biasoletto, F. G. F. Meyen, B. Gaillon, M. J. Berkeley, A. de Brébisson, A. Braun, V. Trevisan, A. H. Hassall, J. J. Roemer, F. C. Mertens, A. G. Roth, and others to accommodate species of coccoid algae. In the 1830's, G. Meneghini and G. Zanardini in Italy, F. T. Kützing and L. Rabenhorst in Germany, W. H. Harvey in England, J. G. Agardh in Sweden, and C. Montagne in France began the careful description and classification of all algae, revising at the same time the work done by colleagues and by past authors. Without separating the Myxophycean forms as a group, they created classifications which would account for a large proportion of the unornamented coccoid algae which we know today.

Carl Nägeli, studying collections of microscopic algae principally from Switzerland, wrote a short paper in 1849 entitled *Gattungen Einzelliger Algen*. He separated the family *Chroococcaceae* from the more obviously green and red algae and divided the species in it among genera characterized by planes of cell division and the resultant distribution of the cells within the gelatinous matrix. The limitations which he set to the variability of the gelatinous matrix have remained with us as an incontrovertible orthodoxy. His classification, an expression of philosophical commitment to his theory of the cell as the unit of structure and function in plants, his descriptions, and his illustrations were so logically and mechanically executed that their material bases have remained almost completely unquestioned until now.

In his *Flora Europaea Algarum* (1864—68), L. Rabenhorst attempted to resolve the classifications of coccoid algae by Kützing, Meneghini, Nägeli, and others, chiefly along Nägelian lines. With this publication as

a basis, and encouraged by the indefatigable Rabenhorst personally and through the media of his journals and published sets of exsiccatae, numerous workers throughout Europe and on other continents devoted themselves to the study of the microscopic algae. Many new genera and species of coccoid Myxophyceae were described, and considerable research in morphology, physiology and geographic distribution was done by J. E. Areschoug, E. Askenasy, J. W. Bailey, G. de Beck, E. Bornet, A. Borzi, A. Braun, C. G. Brügger, V. Cesati, F. Cohn, F. S. Collins, C. Cramer, P. L. and H. M. Crouan, A. de Bary, G. B. de Toni, E. de Wildeman, G. Dickie, W. G. Farlow, C. Flahault, J. Flotow, M. Foslie, C. Gobi, M. Gomont, A. Grunow, R. Gutwinski, A. Hansgirg, C. A. Hantzsch, P. Hariot, F. Hauck, G. Hieronymus, L. Hilse, L. Heufler, F. Hy, H. Itzigsohn, O. Kirchner, L. K. Rosenvinge, G. Lagerheim, A. Le Jolis, E. Lemmermann, P. Magnus, G. Martens, W. Migula, M. Möbius, A. Mougeot, O. Nordstedt, G. de Notaris, M. Perty, M. Raciborski, J. Reinke, P. Richter, J. Rostafinski, J. Schröter, W. A. Setchell, E. Stizenberger, W. F. R. Suringar, G. Thuret, J. E. Tilden, F. Unger, E. Wartmann, A. A. Weber-van Bosse, W. West, N. Wille, V. B. Wittrock, F. Wolle, and others. Thuret and Bornet, as their herbarium indicates, made an abortive attempt to revise the coccoid Myxophyceae; they contributed materially to our understanding of the life histories of numerous species. Itzigsohn and Hansgirg developed theories that among microscopic algae the species are polymorphic and thus not comparable with those of larger plants. This is an inversion of the more common assumption that all morphological variations and transformations through which an organism passes must necessarily be proper to a single species.

Since the early 1890's, many phycologists have occupied themselves with the ecology, cytology, and physiology of the microscopic algae. Historical taxonomy as a field of scientific investigation passed generally out of vogue in the universities toward 1900. At the same time, however, the describing of new taxa was very much accelerated. Until this period, the practice of preserving specimens permanently as indispensable records had been scrupulously observed by students of algae. Now, freed from a tradition of re-examining the material bases for descriptions of these microscopic plants, phycologists evolved an authoritarian taxonomic "science" about algae represented by idealized proxies in manuscript and published descriptions and illustrations, not about real algae. If original specimens were preserved at all, they were stored in liquid, usually in inadequately labeled containers. Some authors described taxa from living material, which was forthwith discarded after camera-lucida drawings had been made. Since 1900 the amount of literature in descriptive taxonomy has become immense, and the tradition has established itself that historical taxonomy in microscopic algae is inconceivable. According to this tradition, the validity of a

species and the application of its name can be judged only from the literary excellence of its description and the artistic excellence of its illustration, not from the plants which the author studied.

A list of the active researchers on the coccoid Myxophyceae since 1890, in addition to those mentioned above, would be too long for inclusion here. Some of the more notable have been G. S. West, A. Forti, N. L. Gardner, O. Jaag, L. Geitler, H. Skuja, A. A. Elenkin, P. Frémy, M. M. Hollerbach, A. Ercegovic, Giuseppe de Toni, and Y. Bharadwaja.

General treatments of the classification of the coccoid Myxophyceae along Nägelian lines, with minor innovations, were made by O. Kirchner in Engler & Prantl, *Natürl. Pflanzenfam.*, vol. 1(1a) (1900), by A. Forti in de Toni, *Sylloge Algarum*, vol. 5 (1907), by J. Tilden in *Minnesota Algae*, vol. 1 (1910), and by others. In 1923, A. A. Elenkin in Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2 (5) introduced a classification of the Chroococcaceae which proceeded much farther than Nägeli's did to enhance the generic and suprageneric value of the gelatinous matrix. This system was elaborated in his *Monographia Algarum Cyanophycearum, Pars Specialis*, Fasc. 1 (1938).

Geitler in Beih. z. Bot. Centralbl., II., 41: 163—294 (1925) summarized the Nägelian classification of the Chroococcaceae with its attritions during seventy-five years and created a new series of families and genera in the groups treated in the present paper as Chamaesiphonaceae and Clastidiaceae. This classification has been further refined in his larger works in Rabenh. Kryptogamen-Fl., ed. 2, vol. 14 (1932) and in Engler & Prantl, *Natürl. Pflanzenfam.*, ed. 2, vol. 1b (1942).

In 1939 we (in Field Mus. Bot. Ser. 20: 67—83) published the results of a tentative inquiry into the life histories and nomenclature of species of Microcystis. Daily, using a similar procedure, treated the Chroococcaceae of Ohio, Kentucky, and Indiana in Amer. Midl. Nat. 27: 636—661 (1942). In *Manual of Phycology* (G. M. Smith, ed.), p. 159 ff. (1951), Drouet briefly summarized the morphology of the three families included in the present paper. We later published a synopsis of the present classification, with keys, and formally introduced the new family *Clastidiaceae* in Butler Univ. Bot. Stud. 10: 220—223 (1952).

MORPHOLOGY

THE PLANT.—This term is employed here to indicate a single free cell or a group of cells joined together, usually in a gelatinous matrix. A specimen or single collection may contain many plants of one or few cells

mixed with other algae; it may be a single entire globule, cushion, or stratum, or a part of one of these. In the Chroococcaceae and some species of Entophysalis, plants of the same species may be found in the form of strata, cushions, or globules (both microscopic and macroscopic), or as free unattached cells.

THE CELL.—In this paper, the term is restricted to the protoplast. Essentially the cell is a mass of protoplasm, containing no differentiated nucleus, and surrounded by a membrane. Gelatinous material is secreted through this membrane to form a sheath or gelatinous matrix about the cell. The protoplasm contains various chlorophyll, xanthophyll, and phycoerythrin pigments, and always the blue pigment phycocyanin. Granules of diverse natures and sizes may be distributed through the protoplasm. Glycoproteins are the end-products of photosynthesis. In some species, especially those of the plankton and those persisting under anaerobic conditions, pseudovacuoles are found. These are irregular in outline, black in transmitted light and red in reflected light. Cell division proceeds by fission, a process in which the cell constricts gradually until the two daughter cells separate and are pushed apart by the gelatinous material secreted; in other cells, membranes grow centripetally through the protoplasm as the constriction proceeds, until the daughter cells are separated by membranes, not by gelatinous material. After division has taken place, the daughter cells enlarge and change in shape so that they resemble the former mother cell. The rate of such regeneration is of course dependent upon environmental conditions, just as the rate of division must be. It is therefore reasonable to admit considerable variation in size of cells in a species, even in various parts of the same plant, according to the nature of the contemporary environment during growth. In the Chamaesiphonaceae, certain cells enlarge and divide internally into many small endospores. The single cells in the Clastidiaceae divide internally into usually uniseriate filaments of numerous cells. Geitler in Engler & Prantl, *Natürl. Pflanzenfam.*, ed. 2., 1b (1942) and F. E. Fritsch in *Structure and Reproduction of the Algae*, vol. 2 (1945) have reviewed the literature on the cytology of these plants.

THE GELATINOUS MATRIX.—This term is here applied to the sheaths about the cells. In a several—many-celled plant, the matrix consists of the sheaths of not only the cells present but also those of the ancestral mother cells for as many previous generations as the plant has existed. The persistence of the ancestral cell-sheaths in the matrix thus often governs the size of the plant itself. The matrix consists of pectins, which, according to their chemical natures and the environmental conditions under which they were produced and have survived, exhibit various types of lamellations about the cells. Like all pectic substances, they hydrolyze readily and may

become dissipated into the surrounding medium; or they remain firm, in parts lamellose, in parts homogeneous. Red and blue coloring matter often develops in the matrices of plants subject to direct insolation and to drying, especially in *Anacystis montana* and several species of *Entophysalis*; these are "indicator" pigments, turning one or the other color in direct response to changes in acidity and alkalinity of the medium. Brown and yellow pigments develop in these and other species (especially in *Coccochloris stagnina* and *Entophysalis deusta*) under similar natural conditions; these pigments also seem to accompany the infestation of the matrices and the parasitization of the cells by fungi. In some species, as in *Coccochloris aeruginosa*, the gelatinous material appears always to hydrolyze as it is extruded. However, this condition of complete hydrolyzation of the matrix and dissociation of the cells occurs frequently in all the species of *Chroococcaceae* and *Entophysalidaceae*. In the *Clastidiaceae*, the thin gelatinous sheath eventually hydrolyzes in part or *in toto*.

PARASITIZATION BY FUNGI. — Except in purified cultures, fungi are present in most habitats occupied by these algae. Where algal growth is rapid, conditions favoring equally rapid growth of the fungi do not often obtain. But in habitats subject to periodic drying, the sheathed *Myxophyceae*, usually perennial, eventually become infested with fungi. Hyphae of saprophytic fungi, as well as bacteria and other algae, are to be found in the gelatinous matrices of most mature plants of the coccoid blue-green algae. Such fungi appear to be responsible for the production of brown pigments in the sheaths, as well as for changes in the consistency and in the acidity and alkalinity of the sheath material. Other fungi parasitize the cells, causing the latter to enlarge, change color, and cease the production of gelatinous material. In *Anacystis montana*, the hyphae often completely surround the cell and encase it in a wall. In most instances, parasitization by fungi results in the death of the *Myxophycean* cells. However, with certain species of fungi, the algae continue to live and grow; and together they develop as lichens. Lichens containing blue-green algae appear more often to result from an association of heterocystous, rather than coccoid, *Myxophyceae* with fungi.

ENDOPHYTISM. — Although various cases of intracellular endophytism of these plants within other organisms have been described and discussed in the literature [see Geitler in Rabenh. *Kryptogamen-Fl.*, ed. 2., vol. 14 (1932) and in Engler & Prantl, *Natürl. Pflanzenfam.*, ed. 2., vol. 1b (1942)], we find no real evidence that the blue-green structures involved, if autonomous organisms at all, are coccoid *Myxophyceae*. If they are not chromatophores containing phycocyanin or a similarly colored pigment, then the behavior of the *Nostocaceae* and other heterocystous blue-green algae in culture and in conditions where they are parasitized by fungi would

suggest that the filamentous Myxophyceae are concerned here. Perhaps when they are cultured in a free state outside their host organisms, these alleged endophytes can be properly disposed in a system of classification.

PRESERVATION AND MICROSCOPICAL TECHNIQUES

Permanent preservation of these algae is most adequately assured by drying. The dried specimens can be placed in paper packets, labeled, and stored in the herbarium. Since most of the species thrive best in subaerial or temporarily inundated habitats, they exist for much of the year in the dried condition in nature. Wet algae can be laid top-side up on paper (newspaper is excellent) and allowed to dry in the open air. Drying in a plant press excludes the air, so that autolysis of the protoplasm takes place; drying with heat often destroys the cells by cooking. If possible, part of the substratum should be preserved as part of the specimen. If the plants are microscopic and mixed with other algae, a good specimen should contain a sufficient number of the plants so that at least several may be found in every field of every mount made for microscopic study. Such small plants, as well as those in plankton collections, may be dried directly on sheets of mica or clear plastic or on glass slides. Plankton organisms are sometimes destroyed during the process of drying unless they are first killed by the addition of formalin. Old collections preserved in formalin etc. can likewise be dried on mica; the material should be spread in a film thin enough for light to pass through it under the microscope.

Dried specimens can be examined microscopically by soaking a fragment in water on the slide, then by crushing it down under a cover glass. If present, sand grains can be teased out with the forceps and removed. Dilute solutions of the common household detergents are excellent mounting media; they soften most of the sheathed Myxophyceae quickly and remove all traces of air imprisoned in and among the algae. By this method even many poorly preserved specimens can be restored to an appearance similar to that of living material. On the other hand, the detergents will remove permanently the pseudovacuoles from the cells of plankton algae. Carbonates can be removed by mounting in dilute solutions of nitric, hydrochloric, citric, or acetic acids or in vinegar or lemon juice. A dilute solution of iodine or a solution of methyl green in slightly acidulated water is useful for staining structures in the protoplasm and sheaths. If a specimen has been dried on mica, plastic, or glass, a drop of water and a cover glass can be placed on the alga; after the examination, the cover glass can be removed and the alga can be allowed to dry again in the open air.

If material preserved in formalin has dried in the container, a solution of a household detergent will usually soften it sufficiently for the making of microscopic mounts. This or a dilute solution of sodium or potassium hydroxide will dissolve the white polymerized formaldehyde deposited on and inside the algae. If microscopic mounts have been made in liquids beneath a cover glass sealed to the slide with a cement, the liquid eventually dries out. The mount can be made useful again by the removal of bits of the cement at opposite corners of the cover glass; water or a dilute solution of a detergent can then be allowed to seep under the cover glass. After examination, the mount can be allowed to dry out before being stored away.

LOCATION OF SPECIMENS AND ACKNOWLEDGMENTS

Herbaria in which specimens cited are to be found are indicated in the lists below by means of the following abbreviations.¹ We are greatly indebted to the persons and to the institutions and their staffs who have made their collections available for this study.

B, Botanisches Museum, Berlin-Dahlem; BIRM, University of Birmingham, Birmingham, England; BKL, Brooklyn Botanic Garden; BM, British Museum (Natural History), London; BR, Jardin Botanique de l'État, Brussels; BUT, Butler University, Indianapolis; C, Botaniske Museum, Copenhagen; CAS, California Academy of Sciences, San Francisco; D, herbarium of Francis Drouet, Chicago; DA, herbarium of William A. Daily, Indianapolis; DT, Algarium de Toni, Brescia, Italy; E, Royal Botanic Garden, Edinburgh; EAR, Earlham College, Richmond, Indiana; FC, Cryptogamic Herbarium, Chicago Natural History Museum; FH, Farlow Herbarium, Cambridge, Massachusetts; FI, Istituto Botanico, Università di Firenze; G, Conservatoire Botanique, Geneva; HA, herbarium of Herbert Habeeb, Grand Falls, New Brunswick; K, Royal Botanic Gardens, Kew, England; KI, herbarium of Walter Kiener, Lincoln, Nebraska; L, Rijksherbarium, Leiden; LD, Botaniska Museum, Lund, Sweden; M, Botanische Staatssammlung, Munich; MICH, University Museums, Ann Arbor, Michigan; MIN, University of Minnesota, Minneapolis; MO, Missouri Botanical Garden, St. Louis; NEB, University of Nebraska, Lincoln; NY, New York Botanical Garden; O, Botaniske Museum, Oslo; PC, Laboratoire de Cryptogamie, Muséum National d'Histoire Naturelle, Paris; PENN, University of Pennsylvania, Philadelphia; PH, Academy of Natural Sciences, Philadelphia; PHI, herbarium of Harry K. Phinney, Corvallis, Oregon; PRC, Botanický Ústav, University Karlovy, Prague; PUH, University of the Philippines, Quezon City; S, Botaniska Avdelningen,

¹These are essentially the abbreviations proposed by Lanjouw & Stafleu in *Index Herbariorum*, Part 1, ed. 2 (1954), adapted to the special requirements of this paper.

Naturhistoriska Riksmuseet, Stockholm; ST, herbarium of J. C. Strickland, Richmond, Virginia; T, Department of Botany, Florida State University, Tallahassee; TA, herbarium of Wm. Randolph Taylor, Ann Arbor, Michigan; TEX, University of Texas, Austin; UC, Herbarium, University of California, Berkeley; UPS, Botaniska Museet, Upsala, Sweden; US, Smithsonian Institution, Washington; W, Naturhistorisches Museum, Vienna; WU, Botanisches Institut, Universität Wien; YU, Osborn Botanical Laboratory, Yale University, New Haven; Z, Botanisches Museum, Universität Zürich; ZT, Institut für Spezielle Botanik, Eidgenössische Technische Hochschule, Zürich.

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CRYPTOGAMIC HERBARIUM, CHICAGO NATURAL HISTORY MUSEUM,
AND
HERBARIUM, BUTLER UNIVERSITY

FAMILY I. CHROOCOCCACEAE

Nägeli, Gatt. Einzell. Alg., p. 44. 1849. *Chroococcaceae* Subfam. *Euchroococcaceae* Hansgirg, Notarisia 3: 589. 1888. *Chroococcaceae* Subfam. *Euchroococcaceae* Tribus *Coccineae* Hansgirg, loc. cit. 1888. *Chroococcaceae* III. *Gloeococceae-stereometreae* B. *Heterogloae* Elenkin, Not. Syst. Crypt. Horti Bot. Petropol. 2: 67. 1923. *Chroococcaceae* III. *Gloeococceae-stereometreae* B. *Heterogloae* 1. *Tegumentotenuiores* Elenkin, *ibid.*, p. 68. 1923. —Type genus: *Chroococcus* Näg.

Chroococcaceae Subfam. *Euchroococcaceae* Tribus *Phyllotheceae* Hansgirg, Notarisia 3: 589. 1888. *Chroococcaceae* II. *Gloeococceae-planimetreae* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 66. 1923. *Merismopoediaceae* Elenkin, Acta Inst. Bot. Acad. Sci. U. R. S. S., II, 1: 19. 1933. —Type genus: *Merismopoedia* Kütz.

Chroococcaceae I. *Coccobactreae* Elenkin, Not. Syst. Crypt. Hort. Bot. Petropol. 2: 65. 1923. —Type genus: *Synechococcus* Näg.

Chroococcaceae III. *Gloeococceae-stereometreae* A. *Homoeogloae* 2. *Excavatae* Elenkin, Not. Syst.

Inst. Crypt. Horti Bot. Petropol. 2: 67. 1923. *Chroococcaceae* III. *Gloeococceae-stereometreae* A. Homoeogloeeae 2. *Excavatae* a) *Distantes* Elenkin, loc. cit. 1923. *Gomphosphaeriaceae* Elenkin, Acta Inst. Bot. Acad. Sci. U. R. S. S., II, 1: 18. 1933. —Type genus: *Gomphosphaeria* Kütz.
Chroococcaceae III. *Gloeococceae-stereometreae* B. *Heterogloeeae* 2. *Tegumentocrassiores* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 68. 1923. *Gloeocapsaceae* Elenkin, Acta Inst. Bot. Acad. Sci. U. R. S. S., II, 1: 19. 1938. —Type genus: *Gloeocapsa* Kütz.
Holopediaceae Elenkin, Acta Inst. Bot. Acad. Sci. U. R. S. S., II, 1: 19. 1933. *Beckiaceae* Elenkin, loc. cit. 1933. —Type genus: *Holopedium* Lagerh.

The following family names have type species of their type genera for which no original specimens have been available to us for study:

Woronichiniaceae Elenkin, Acta Inst. Bot. Acad. Sci. U. R. S. S., II, 1: 18. 1933. —Type genus: *Woronichinia* Elenk.

Coelosphaeriaceae Elenkin, Acta Inst. Bot. Acad. Sci. U. R. S. S., II, 1: 18. 1933. —Type genus: *Coelosphaerium* Näg. (= *Coelocystis* Näg.).

Plantae uni—multi-cellulares, microscopicae vel macroscopicae, forma et magnitudine et ambitu diversae, libere in aqua natantes vel in stratis crescentes, cellulis sphaericis, discoideis, ovoideis, ellipticis, cylindraceis, vel pyriformibus, unaquidque in duas cellulas-filias aequales dividente, unaquidque mox ab aliis cum gelatino vaginale se separante; reproductione a fragmentatione.

Most of the species of *Chroococcaceae* are capable of developing in various ways: as microscopic or macroscopic globular aquatic plants with homogeneous or lamellose matrices; as aquatic, subaerial, or aerial strata or cushions; or as free single cells where the sheath material has completely hydrolyzed. The cells, their methods of division and regeneration, and the arrangement of the cells in the plant are the chief means of distinguishing genera and species. Division of a cell into two equal daughter-cells is characteristic of the family.

Many of the unornamented coccoid and palmelloid *Chlorophyceae* have been described or transferred into this family at one time or another, even in recent years. *Palmogloea protuberans* (Sm. & Sow.) Kütz. is perhaps the most often placed here by mistake. Palmelloid flagellates and the primordia of *Ulotrichaceae*, *Chaetophoraceae*, *Ulvaceae*, and even *Trentepohliaceae*, especially where preserved in liquids, have often been interpreted as *Chroococcaceae*. The presence of chloroplasts, pyrenoids, starch, and cellulose walls should make the *Chlorophycean* affinities obvious. Likewise, *Porphyridium*, *Asterocystis*, and *Porphyra* spp. are sometimes mistakenly supposed to be *Chroococcaceae*. Spores of *Nostocaceae* and few-celled hormogonia of the smaller species of *Phormidium*, *Plectonema*, and *Scytonema* have been confused with members of this family. Bacteria and certain spores and cells of fungi also simulate these plants.

The measurements for cells noted in the keys and descriptions here are those generally encountered. Where successive divisions procede at a rapid rate and enlargement at a slow rate, cells may be found which are smaller than those recorded here. With a reversal of these extremes, the largest measurements could be exceeded.

Key to genera:

1. Cells before division ovoid to cylindrical, longer than broad, each dividing in a plane perpendicular to the long axis 1. COCCOCHLORIS
1. Cells before division spherical, ovoid, discoid, cylindrical, or pyriform, never dividing in planes perpendicular to the long axis 2.

2. Cells before division spherical, irregularly distributed within the gelatinous matrix or arranged more or less regularly in series of rows in three planes perpendicular to each other; cell division proceeding successively in three planes perpendicular to each other 2. ANACYSTIS
2. Cells before division discoid, distributed in a single linear series within the gelatinous matrix; division proceeding in a single plane through the diameter of the cell 3. JOHANNESBAPTISTIA
2. Cells before division spherical, ovoid, cylindrical, or pyriform, distributed through a flat or curved surface; cell division proceeding successively in two planes perpendicular to each other 3.
3. Plant a flat or curved plate; cells spherical, ovoid, or cylindrical, arranged regularly in series of rows perpendicular to each other. 4. AGMENELLUM
3. Plant a flat or curved plate; cells ovoid or cylindrical, irregularly arranged 5. MICROCROCIS
3. Plant spherical or ovoid; cells spherical to ovoid, cylindrical, or pyriform, regularly or irregularly arranged 6. GOMPHOSPHERIA

GENUS 1. COCCOCHLORIS

Sprengel, Linn. Syst. Vegetabil., ed. 16, 4(1): 314. 1827. *Aphanothece* Sectio *Coccochloris* Sprengel ex Kirchner in Engler & Prantl, Natürl. Pflanzenfam., ed. 1, 1(1a): 55. 1898. *Aphanothece* Subgenus *Coccochloris* Kirchner ex Forti, Syll. Myxophyc., p. 76. 1907. *Microcystis* α *Macroscopicae* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 67. 1923. *Microcystis* α *Macroscopicae* Subgenus *Eucoccochloris* Elenkin, loc. cit. 1923. —Type species: *Coccochloris stagnina* Spreng.

Synechococcus Nägeli, Gatt. Einzell. Alg., p. 56. 1849. *Chroothece* Sectio *Synechococcus* Nägeli ex Hansgirg, Oesterr. Bot. Zeitschr. 34: 352. 1884. *Synechococcus* Subgenus *Eusynechococcus* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 65. 1923. —Type species: *Synechococcus elongatus* Näg. (= *Protococcus elongatus* Näg.).

Gloeothece Nägeli, Gatt. Einzell. Alg., p. 57. 1849. *Gloeocapsa* Subgenus *Gloeothece* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 69. 1923. —Type species: *Gloeothece linearis* Näg.

Gloeocapsa Sectio *Rhodocapsa* Hansgirg, Prodr. Algenfl. Böhmen 2: 147. 1892. —Type species: *Gloeocapsa purpurea* Kütz.

Gloeocapsa Sectio *Xanthocapsa* Nägeli ex Kirchner in Engler & Prantl, Natürl. Pflanzenfam., ed. 1, 1(1a): 54. 1898. —Type species: *Gloeocapsa fuscolutea* Näg.

Original specimens of the type species of the following generic and subgeneric names have not been available to us for study:

Aphanothece Nägeli, Gatt. Einzell. Alg., p. 59. 1849. *Aphanothece* Sectio *Aphanothece* Nägeli ex Kirchner in Engler & Prantl, Natürl. Pflanzenfam., ed. 1, 1(1a): 55. 1898. *Aphanothece* Subgenus *Aphanothece* Kirchner ex Forti, Syll. Myxophyc., p. 79. 1907. —Type species: *Aphanothece microscopica* Näg.

Rhabdoderma Schmidle & Lauterborn, Ber. Deutsch. Bot. Ges. 18: 148. 1900. *Gloeocapsa* Subgenus *Rhabdoderma* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 69. 1923. —Type species: *Rhabdoderma lineare* Schmidle & Lauterb.

Bacularia Borzi, Nuova Notarisia 1905: 21. 1905. —Type species: *B. coerulescens* Borzi.

Rhabdogloea Schröder, Ber. Deutsch. Bot. Ges. 35: 549. 1917. —Type species: *R. ellipsoidea* Schröder.

Spirillopsis Naumann, K. Sv. Vet.-Akad. Handl. 62(4): 18. 1921. —Type species: *S. irregularis* Naum.

Cyanocloster Kufferath, Ann. Crypt. Exot. 2: 49. 1929. —Type species: *C. muscicola* Kuff.

Krkia Pevalek, Acta Bot. Inst. Bot. Univ. Zagreb. 4: 55. 1929. —Type species: *K. croatica* Peval.

Dzensia Woronichin, Bull. Jard. Bot. Princip. U. R. S. S. 28: 155. 1929. —Type species: *D. salina* Woronich.

Tetrarcus Skuja, Acta Horti Bot. Univ. Latv. 7: 46. 1932. —Type species: *T. Ilsteri* Skuja.

Plantae microscopicae vel macroscopicae, 1—pluri-cellulares, cellulis in divisione subsphaericis usque ad cylindraceas, aetate protracta ovoideis usque ad longi-cylindraceas, divisione semper in uno plano ad axem cellulae perpendiculari; gelatino vaginale hyalino vel deinde (in *C. stagnina*) lutescente, homogeneo vel lamelloso.

The mature cells of all the species of *Coccochloris* are characteristically elongate; they divide only at right angles to their long axes. Considerable variation in lengths and diameters of cells of each species should be expected according to the histories of the microenvironments in which the plants were produced.

Subaerial and aerial strata of *Palmogloea protuberans* (Sm. & Sow.) Kütz. are often confused with species here. Likewise, certain bacteria and the one—few-celled hormogonia of *Scytonema* and the smaller species of *Phormidium* and *Plectonema* can be mistaken for species of *Coccochloris*.

Key to species of *Coccochloris*:

Cells before division ovoid to cylindrico-elliptic, 7—45 μ broad, up to 3 times as long as broad 1. *C. AERUGINOSA*

Cells before division ovoid to cylindrico-elliptic, (3—)4—8 μ broad, up to 3 times as long as broad 2. *C. STAGNINA*

Cells before division cylindrical (usually quasi-truncate at the ends), straight, 2—6 μ broad, up to 8 times as long as broad 3. *C. ELABENS*

Cells before division cylindrical (rotund or tapering at the ends), often curved, 1—3 μ broad, up to 12 times as long as broad 4. *C. PENIOCYSTIS*

1. *COCCOCHLORIS AERUGINOSA* Drouet & Daily, Butler Univ. Bot. Stud. 10: 222. 1952. *Synechococcus aeruginosus* Nägeli, Gatt. Einzell. Alg., p. 56. 1849. —Type from Lucerne, Switzerland (ZT).

Synechococcus major f. *crassior* Lagerheim, Bot. Not. 1886: 50. 1886. *S. major* var. *crassior* Lagerheim ex Hansgirg, Prodr. Algenfl. Böhmen 2: 139. 1892. *S. crassus* f. *crassior* Lagerheim ex Forti, Syll. Myxophyc., p. 27. 1907. *S. aeruginosus* f. *crassior* Lagerheim ex Wille, Nyt Mag. Naturvidenskab. 62: 203. 1925. —Type from Upsala, Sweden (S). FIG. 143.

Synechococcus aeruginosus f. *angustior* West, Proc. Roy. Irish Acad. 31: 40. 1912. —Type from Clare island, Ireland (BIRM).

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Synechococcus crassus Archer, Quart. Journ. Microsc. Sci., N. S. 7: 87. 1867. *S. major* f. *crassus* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 35. 1938.

Synechococcus major Schröter, Jahresber. Schles. Ges. Vaterl. Cultur 1883: 188. 1884.

Synechococcus major var. *maximus* Lemmermann, Forschungsber. Biol. Sta. Plön 4: 130. 1896. *S. aeruginosus* var. *maximus* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 46. 1907; Lemmermann ex Forti, Syll. Myxophyc., p. 27. 1907. *S. major* f. *maximus* Lemmermann ex Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 35. 1938.

Synechococcus roseo-purpureus G. S. West, Journ. of Bot. 37: 265. 1899. —The original sketch and notes from the West notebooks in the British Museum (Natural History) are reproduced here: FIG. 144.

Synechococcus grandis Playfair, Proc. Linn. Soc. New South Wales 43: 499. 1918.

Synechococcus aeruginosus var. *salinus* Meyer, Izvest. Gosudarstv. Gidrol. Inst. (Bull. de l'Inst. Hydrol. Russie) 15: 37. 1925.

Synechococcus diachloros Skuja, Acta Horti Bot. Univ. Latv. 11—12: 43. 1939.

Plantae laete aerugineae vel olivaceae, microscopicae, 1—2 cellulares, cellulis in divisione binis truncato-sphaericis usque ad truncato-ovoideas vel truncato-subcylindricas, aetate provecta ovoideo-cylindraceis vel cylindrico-ellipticis, diametro 7—45 μ crassis, usque ad 3-plo longiores; gelatino vaginale hyalino, tenue vel omnino diffuente; protoplasmate aerugineo vel olivaceo, saepe sparsim grosse-granuloso. FIGS. 143, 144.

In shallow water and seepage in bogs, ponds, and lakes, seldom found in the plankton, seldom in brackish water. Cells of *Anacystis dimidiata* with the gelatinous matrix almost completely hydrolyzed are often confused with this species. Isolated spores of *Anabaena* and *Cylindrospermum* spp. superficially resemble the cells of *Coccochloris aeruginosa*.

Specimens examined:

FINLAND: in scrobiculis rupium ad Mariehamn, G. Lagerheim, Aug. 1898 (S). NORWAY: prope Molde, N. Wille, Jul. 1919 (S). SWEDEN: in Lassby backar prope Upsaliam, Lagerheim, 18 May 1884 (Type of *Synechococcus major* f. *crassior* Lagerh. in Witr. & Nordst., Alg. Exs. no. 792a, S; isotypes, FC [Fig. 143], L, MIN); in Norby skog prope Upsaliam, Lagerheim, May 1884 (as *S. major* in Witr. & Nordst., Alg. Exs. no. 792b, FC, L, MIN, S); in stagno parvo ad Malmagen Herjedaliae, Lagerheim, 1897 (S); Djurö, Uplandia, O. Borge, Aug. 1908 (S); Marstrand, Bohuslan, O. Nordstedt, Jun. 1876 (S). GERMANY: Saxon Switzerland: C. A. Hantzsch (FC); aus der Schlucht, die vom Wildenstein (Kuhstall) abwärts nach dem Habichtsgrund führt, auch in grossen Zschand an einer Felswand, C. Biene (as *S. aeruginosus* in Rabenh. Alg. no. 1335, L, NY, UC). CZECHOSLOVAKIA: Bohemia: Dittersbach—Hinter-Dittersbach, A. Hansgirk, Jul. 1889 (FC, W); an einem Felsen bie Dittersbach, Rostock, Jun. 1861 (as *S. aeruginosus* with *Sirospion saxicola* in Rabenh. Alg. no. 1120, FC); mit *Urococcus insignis*, Bielathal, W. Krieger, Aug. 1881 (TA). SWITZERLAND: Luzern, an nassen Felsen, C. von Nägeli, Dec. 1847 (Type of *Synechococcus aeruginosus* Näg., ZT). IRELAND: Clare island (Type of *S. aeruginosus* f. *angustior* West, BIRM). MAINE: sphagnum pool, tableland on south spur of Mt. Katahdin, B. M. Davis 13, Aug. 1902 (FC, MICH). NEW HAMPSHIRE: the Flume, W. G. Farlow (FH); pool near Lake of the Clouds, summit of Mt. Washington, C. Bullard, 13 Sept. 1912 (as *S. crassus* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1951, FC, L, TA). VERMONT: on rocks in cave, Lake Willoughby, W. G. Farlow, Aug. 1880 (FC).

QUEBEC: falaise humide, pic à Rousseau dans les monts Otish, J. Rousseau 389, 10 Aug. 1949 (FC); roche moutonnée, ou suinte une source, Rivière Payne, vers 71° 25' long. O., J. Rousseau 1134, 11 Aug. 1948 (FC); mousses d'un étang, embouchure de la Kogaluk, baie d'Hudson, Rousseau 208, 16 Jul. 1948 (FC); sur les pierres, Ile Marie Victorin, Lac Mistassini, J. & E. Rousseau 321a, 14 Jul. 1944 (FC). NORTH CAROLINA: in rock pools, Mt. Whitesides and summit of Yellow Mountain, Jackson county, H. C. Bold H95b, H140, Jun. 1939 (FC). FLORIDA: on roots in ditch near Kissimmee, Osceola county, P. O. Schallert 1853, 1 Mar. 1948 (FC). KENTUCKY: on sandstone overhang, Tight Hollow, Pine Ridge, Wolfe county, W. A. & F. K. Daily 849, 854, 25 May 1941 (DA, FC). TENNESSEE: wet sandstone in Falls Creek Canyon, Van Buren county, H. Silva 675, 4 May 1947 (FC, TENN). WYOMING: drying pool, bottom of small lake near Island lake, Shoshone national forest, Park county, F. H. Rose & F. A. Barkley 4050, 7 Sept. 1940 (FC). MONTANA: shallow pool, Rattlesnake creek, Missoula county, Rose 4063, 10 Oct. 1940 (FC). COLORADO: over mosses on a siliceous rock ledge, South Colony creek, Custer county, W. Kiener 10393a, 9 Jul. 1941 (FC, KI). BRITISH COLUMBIA: in wet moss near Glacier, Kootenay county, W. R. Taylor 10, Aug. 1921 (FH, NY, TA). PUERTO RICO: on shaded rocks at the "Campo", Maricao, N. Wille 1235, Feb. 1915 (NY).

2. *COCCOCHLORIS STAGNINA* Sprengel, Fl. Halens., Mantissa 1: 14. 1807. *Aphanothece stagnina* A. Braun in Rabenhorst, Alg. Eur. 157 & 158: 1572. 1863. —Type from Dieskau near Halle, Germany (FC). FIG. 154.

Palmella rupestris Lyngbye, Tent. Hydrophyt. Dan., p. 207. 1819. *Coccochloris rupestris*

Sprengel, Linn. Syst. Vegetab., ed. 16, 4(1): 373. 1827. *Microcystis rupestris* Kützing, Linnaea 8: 374. 1833. *Protococcus rupestris* Corda in Sturm, Deutschl. Fl., Abt. 2, 6: 45. 1833. *Microbaloa rupestris* Kützing, Phyc. Gener., p. 169. 1843; Linnaea 17: 84. 1843. *Haematococcus rupestris* Hassall, Hist. Brit. Freshw. Alg. 1: 326. 1845. *Micraloa rupestris* Kützing ex Trevisan, Sagg. Monogr. Alg. Coccot., p. 38. 1848. *Bichatia rupestris* Trevisan, ibid. p. 62. 1848. *Gloeocapsa rupicola* Kützing, Sp. Algar., p. 221. 1849. *Gloeocystis rupestris* Rabenhorst, Fl. Eur. Algar. 3: 30. 1868. *Gloeotheca rupestris* Bornet in Wittrock & Nordstedt, Alg. Exs. 8: 399. 1880. *Bichatia rupicola* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Gloeocapsa rupestris* Dalla Torre & Sarnthein, Fl. Tirol 2: 157. 1901. *Anacystis rupestris* Drouet & Daily in Daily, Amer. Midl. Nat. 27: 650. 1942. *Coccolchloris stagnina* f. *rupestris* Drouet & Daily, Lloydia 11: 78. 1948. —Type from Nass, Norway (C). FIG. 148.

Palmella obscura Sommerfelt, Suppl. Fl. Lappon., p. 203. 1826. —Type from Saltdal, Norway (C).

Palmella bulbosa Kützing, Alg. Aq. Dulc. Dec. 16: 154. 1836. *Microcystis bulbosa* Meneghini, Consp. Algal. Eug., p. 324. 1837. *Bichatia bulbosa* Trevisan, Nomencl. Algar. 1: 60. 1845. *Cagniardia bulbosa* Trevisan, Sagg. Monogr. Alg. Coccot., p. 49. 1848. *Aphanothece bulbosa* Rabenhorst, Fl. Eur. Algar. 2: 65. 1865. *Coccolchloris bulbosa* Kuntze, Rev. Gen. Pl. 3(2): 546. 1898. *Glaucocystis bulbosa* Wille, Nyt Mag. Naturvidensk. 56(1): 38. 1918. —Type from Battaglia, Italy (L).

Microcystis gelatinosa Meneghini, Consp. Algal. Eug., p. 324. 1837. —Type from the Euganean springs, Italy (FI).

Palmella Mooreana Harvey, Man. Brit. Alg., p. 178. 1841. *Coccolchloris Mooreana* Hassall, Hist. Brit. Freshw. Alg. 1: 316. 1845. *Palmogloea Mooreana* Crouan fr., Fl. du Finistère, p. 110. 1867. *Aphanothece Mooreana* Lagerheim, Öfvers. K. Sv. Vet.-Akad. Forh. 30(2): 44. 1883. —Type from near Lough Neagh, Ireland (K). FIG. 158.

Microcystis paroliniana Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5(Sci. Fis. & Mat.): 78. 1843. *Bichatia paroliniana* Trevisan, Nomencl. Algar. 1: 61. 1845. *Gloeocapsa paroliniana* Brébisson in Kützing, Tab. Phyc. 1: 25. 1846. *Gloeocystis paroliniana* Nägeli, Gatt. Einzell. Alg., p. 65. 1849. —Type from Oliero, Italy (FI). FIG. 152.

Microcystis microspora Meneghini, Mem. R. Accad. Torino, ser. 2, 5(Sci. Fis. & Mat.): 80. 1843. *Bichatia microspora* Trevisan, Nomencl. Algar. 1: 61. 1845. *Palmella microspora* Kützing, Tab. Phyc. 1: 11. 1846. *Aphanothece microspora* Rabenhorst, Krypt.-Fl. Sachsen 1: 76. 1863. *Palmogloea microspora* Crouan fr., Fl. du Finistère, p. 110. 1867. —Type from the Euganean springs (FI).

Protococcus minutus Kützing, Phyc. Gener., p. 168. 1843. *Pleurococcus minutus* Trevisan, Sagg. Monogr. Alg. Coccot., p. 33. 1848. *Chroococcus minutus* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. *Protococcus minutus* var. *caerulescens* Brébisson in Rabenhorst, Alg. Eur. 201–204: 2035. 1867. *Gloeocapsa minuta* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 233. 1938. —Type from Nordhausen, Germany (L). FIG. 145.

Gloeocapsa thermalis Kützing, Phyc. Gener., p. 173. 1843. *Bichatia thermalis* Trevisan, Nomencl. Algar. 1: 62. 1845. —Type from Battaglia, Italy (L).

Gloeocapsa gelatinosa Kützing, Phyc. Gener., p. 174. 1843. *Palmella gelatinosa* Meneghini pro synon. in Kützing, loc. cit. 1843. *Bichatia gelatinosa* Trevisan, Sagg. Monogr. Alg. Coccot., p. 63. 1848. *Gloeocapsa gelatinosa* α *olivacea* Kützing, Sp. Algar., p. 219. 1849. —Type from Battaglia, Italy (L). FIG. 163.

Palmella pallida Kützing, Phyc. Germ., p. 149. 1845. *Cagniardia pallida* Trevisan, Sagg. Monogr. Alg. Coccot., p. 49. 1848. *Aphanothece pallida* Rabenhorst, Krypt.-Fl. Sachsen 1: 76. 1863. *Polycystis pallida* Thuret ex Farlow in Farlow, Anderson & Eaton, Alg. Exs. Amer. Bor. 4: 179. 1881. *Microcystis pallida* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 77. 1907. —Type from the Harz mountains, Germany (L).

Coccolchloris cystifera Hassall, Hist. Brit. Freshw. Alg. 1: 441. 1845. *Bichatia cystiphora* Trevisan, Sagg. Monogr. Alg. Coccot., p. 66. 1848. *Gloeotheca cystifera* Rabenhorst, Fl. Eur. Algar. 2: 61. 1865. —Type from Bristol, England (BM).

Protococcus julianus Kützing, Tab. Phyc. 1: 5. 1846. *P. Kuetzingianus* Trevisan, Sagg. Monogr. Alg. Coccot., p. 26. 1848. *Gloeocapsa fulva* Kützing, Sp. Algar., p. 224. 1849. *Bichatia fulva* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Abano, Italy (L).

Coccolchloris stagnina β *cuprina* Kützing, Sp. Algar., p. 216. 1849. *Palmella cuprina* Agardh pro synon. ex Kützing, loc. cit. 1849. *Aphanothece stagnina* β *cuprina* Kützing ex Forti, Syll. Myxophyc., p. 77. 1907. —Type from Scania, Sweden (FI).

Gloeocapsa gelatinosa β *aeruginea* Kützing, Sp. Algar., p. 219. 1849. *Gloeotheca palea* var. *aeruginea* Hansgirg, Physiol. & Algal. Stud., p. 140. 1887. *G. palea aeruginosa* Hansgirg ex Gardner, New York Acad. Sci., Sci. Surv. Porto Rico 8: 259. 1932. *Gloeocapsa gelatinosa aeruginosa* Kützing ex Gardner, loc. cit. 1932. —Type from Abano, Italy (L).

Gloeocapsa fuscolutea Nägeli in Kützing, Sp. Algar., p. 224. 1849. *G. fuscolutea* α *acbroa*

Kützing, loc. cit. 1849. *Gloeotheca fuscolutea* Nägeli, Gatt. Einzell. Alg., p. 57. 1849. —Type from Küsnacht, Zürich, Switzerland (L).

Gloeocapsa fuscolutea β *holochroa* Kützing, Sp. Algar., p. 224. 1849. *Gloeotheca fuscolutea* var. *holochroa* Kützing ex Wartmann & Winter, Schweiz. Krypt. no. 847. —Type from Küsnacht, Zürich, Switzerland (L).

Gloeocapsa fuscolutea γ *bemichroa* Kützing, Sp. Algar., p. 224. 1849. —Type from Küsnacht, Zürich, Switzerland (L).

Gloeocapsa Kuetzingiana Nägeli in Kützing, Sp. Algar., p. 224. 1849; Nägeli, Gatt. Einzell. Alg., p. 51. 1849. *Bichatia Kuetzingiana* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Küsnacht, Zürich, Switzerland (L). FIG. 159.

Gloeotheca devia Nägeli, Gatt. Einzell. Alg., p. 58. 1849. —Type from Lucerne, Switzerland (ZT).

Gloeocapsa tepidarium A. Braun in Rabenhorst, Alg. Sachs. 23 & 24: 221. 1852. *Gloeotheca tepidarium* Lagerheim, Öfvers. K. Sv. Vet.-Akad. Forh. 40(2): 44. 1883. *G. rupestris* var. *tepidarium* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 354. 1891. *Bichatia tepidarium* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Gloeotheca rupestris* b. *tepidarium* Hansgirg, Prodr. Algenfl. Böhmen 2: 136. 1892. —Type from Berlin, Germany (L). FIG. 157.

Gloeocapsa aurata Stizenberger in Rabenhorst, Alg. Sachs. 61 & 62: 607. 1857. *Bichatia aurata* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Isotypes from Constanza, Germany (FC, L, MIN, PC, TA, UC).

Aphanothece Naegelii Wartmann in Rabenhorst, Alg. Sachs. 109-110: 1093. 1861. —Type from St. Gallen, Switzerland (ZT). FIG. 147.

Palmella heterococca Kützing, Osterprogram d. Realschule zu Nordhausen, p. 6. 1863; Hedwigia 2: 86. 1863. —Type from Vera Cruz, Mexico (L). FIG. 153.

Gloeocystis rupestris Rabenhorst, Krypt.-Fl. Sachsen 1: 128. 1863. —Type from Planitz, Germany (FC).

Aphanothece (stagnina var.) prasina A. Braun in Rabenhorst, Alg. Sachs. 57 & 58: 1572. 1863. *Coccochloris stagnina* var. *prasina* A. Braun ex Richter, Hedwigia 25: 254. 1886. *C. stagnina* b. *prasina* Richter ex Hansgirg, Prodr. Algenfl. Böhmen 2: 141. 1892. *Aphanothece stagnina* f. *prasina* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 144. 1938. *Anacystis rupestris* var. *prasina* Drouet & Daily in Daily, Amer. Midl. Nat. 27: 651. 1942. —Type from Berlin, Germany (FC). FIG. 161.

Gloeotheca carpathica Grunow in Rabenhorst, Fl. Eur. Algar. 2: 63. 1865. —Type from Wallendorf, Slovakia (W).

Gloeotheca Heufleri Grunow in Rabenhorst, Fl. Eur. Algar. 2: 63. 1865. —Type from Kindberg, Styria (W).

Aphanothece (stagnina var.) coerulescens A. Braun in Rabenhorst, Alg. Sachs. 157 & 158: 1572. 1863; A. Braun in Rabenhorst, Fl. Eur. Algar. 2: 66. 1865. —Type from Pillnitz, Germany (L).

Palmella Jesenii Wood, Proc. Amer. Philos. Soc. 11: 134. 1869. —Type from Philadelphia, Pennsylvania (in herb. Princeton University in NY).

Gloeotheca decipiens A. Braun in Wittrock & Nordstedt, Alg. Exs. 12: 594. 1883. —Type from Berlin, Germany (L). FIG. 149.

Chroococcus montanus Hansgirg, Notarisia 3: 400. 1888. —Type from Libsic, Bohemia (W). FIG. 150.

Polycystis litoralis Hansgirg in Foslie, Contrib. Knowl. Mar. Alg. Norway 1: 169. 1890. *Microcystis litoralis* Forti, Syll. Myxophyc., p. 89. 1907. —Isotype from Bugönaes, Norway (L).

Gloeotheca samoensis f. *major* Wille in Reehinger, Bot. & Zool. Ergebn. Samoa & Salomoninseln, Süßwasseralg., p. 7. 1914. —Type from Upolu, Samoa (O).

Gloeocapsa luteo-fusca Martens ex Wille, Nyt Mag. Naturvid. 62: 191. 1925. —Type from Pegu, Burma (LD).

Aphanothece gelatinosa Gardner, Univ. Calif. Publ. Bot. 14: 2. 1927. *A. Gardneri* J. de Toni, Noter. di Nomencl. Algol. VIII. 1936. —Type from Fukien province, China (FH).

Aphanocapsa Richtiana var. *major* Gardner, Mem. New York Bot. Gard. 7: 4. 1927. *A. Richtiana* *major* Gardner, New York Acad. Sci., Sci. Surv. Porto Rico 8: 253. 1932. —Type from Palmer, Puerto Rico (NY).

Aphanothece conferta var. *brevis* Gardner, Mem. New York Bot. Gard. 7: 5. 1927. *A. conferta* *brevis* Gardner, New York Acad. Sci., Sci. Surv. Porto Rico 8: 254. 1932. —Type from Maricao, Puerto Rico (NY). FIG. 160.

Aphanothece microscopica var. *granulosa* Gardner, Mem. New York Bot. Gard. 7: 5. 1927. *A. microscopica* *granulosa* Gardner, New York Acad. Sci., Sci. Surv. Porto Rico 8: 254. 1932. —Type from Penuelas, Puerto Rico (NY). FIG. 151.

Gloeocapsa quaternata var. *major* Gardner, Mem. New York Bot. Gard. 7: 12. 1927. *G. quaternata* *major* Gardner, New York Acad. Sci., Sci. Surv. Porto Rico 8: 258. 1932. —Type from San Juan, Puerto Rico (NY). FIG. 146.

Gloeotheca interspersa Gardner, Mem. New York Bot. Gard. 7: 13. 1927. —Type from Santurce, Puerto Rico. (NY). FIG. 155.

Anacystis cylindracea Gardner, Mem. New York Bot. Gard. 7: 19. 1927. —Type from near Utuado, Puerto Rico (NY). FIG. 156.

Aphanothece bulbosa var. *minor* Geitler, Arch. f. Hydrobiol., Suppl. XII, Trop. Binnengew. 4: 622. 1933. *A. bulbosa* var. *major* Geitler, ibid. Suppl. XIV, 6: 374. 1935. —Type from Bukit Kili, Sumatra (in the collection of L. Geitler).

Gloeotheca rupestris var. *major* Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 622. 1933. —Type from Panjingahan, Sumatra (in the collection of L. Geitler).

Cyanostylon banyolensis Margalef, Publ. Inst. Biol. Aplic. Barcelona 1: 60. 1946. —Type from Lago de Bañolas, Girona, Spain (D).

Original specimens have not been available to us for the following names; their descriptions are here designated as the Types until the specimens can be found:

Gloeocapsa polyzonia Perty, Bewegung Durch Schwingende Mikroskop. Organe, p. 39. 1848. *G. polydermatica* b. *polyzonia* Perty ex Rabenhorst, Fl. Eur. Algar. 2: 37. 1865. *G. polydermatica* f. *polyzonia* Perty ex Forti, Syll. Myxophyc., p. 52. 1907.

Aphanothece microscopica Nägeli, Gatt. Einzell. Alg., p. 59. 1849. —No specimens labeled thus appear to be present in the Nägeli collections of either the Staatssammlung at Munich or the Institut für Spezielle Botanik, Eidgenössische Technische Hochschule at Zürich. The original notes and sketches of Nägeli in the Pflanzenphysiologisches Institut of the latter institution are reproduced here: FIG. 162.

Gloeotheca nigrescens Rabenhorst, Krypt.-Fl. v. Sachsen 1: 76. 1863.

Aphanothece pallida var. *micrococca* Brügger, Jahresber. Naturf. Ges. Graubündens, N. F. 8: 245. 1863. *Aphanocapsa pallida* var. *micrococca* Brügger ex Rabenhorst, Hedwigia 1863: 181. 1863. *Aphanothece pallida* b. *micrococca* Brügger ex Rabenhorst, Fl. Eur. Algar. 2: 65. 1865.

Gloeocapsa aurata var. *alpicola* Brügger, Jahresber. Naturf. Ges. Graubündens, N. F. 8: 247. 1863; Hedwigia 1863: 181. 1863. *G. aurata* b. *alpicola* Brügger ex Rabenhorst, Fl. Eur. Algar. 2: 47. 1865.

Polycystis piscinalis Brügger, Jahresber. Naturf. Ges. Graubündens, N. F. 8: 249. 1863; Hedwigia 1863: 181. 1863. *Microcystis piscinalis* Forti, Syll. Myxophyc., p. 90. 1907.

Polycystis piscinalis var. *Microcystis* Brügger, Jahresber. Naturf. Ges. Graubündens, N. F. 8: 249. 1863; Hedwigia 1863: 181. 1863.

Gloeocapsa sparsa Wood, Proc. Amer. Philos. Soc. 11: 123. 1869.

Gloeotheca ambigua A. Braun, Sitzungsber. Ges. Naturf. Fr. Berlin 1875: 99. 1875.

Gomphosphaeria anomala Bennett, Journ. Roy. Microsc. Soc. London, ser. 2, 8: 3. 1888. *Coelospaerium anomalum* de Toni & Levi, Notarisia 3: 528. 1888.

Chroococcus consociatus Hariot, Bull. Soc. Bot. France 38: 416. 1891.

Microcystis maxima Bernard, Protococc. & Desmid. d'Eau Douce, p. 49. 1908.

Chroococcus Rochei Virieux, Soc. d'Hist. Nat. Doubs 21: 51. 1911.

Aphanothece prasina f. *minor* Wille, Deutsche Südpolar-Exped. 1901—03, 8: 414. 1928.

Microcystis kerguelensis Wille, Deutsche Südpolar-Exped. 1901—03, 8: 416. 1928.

Gloeocapsa rupestris var. *achroa* Beck-Mannagetta, Lotos 77: 99. 1929.

Aphanothece stagnina var. *nemathece* Frémy, Arch. de Bot. Caen 3 (Mém. 2): 26. 1930.

Aphanocapsa rivularis f. *major* Petkoff, Bull. Soc. Bot. Bulgarie 4: 104. 1931.

Gloeotheca rupestris var. *chalybea* Krieger, Hedwigia 70: 151. 1931.

Aphanothece pallida f. *minor* Dixit, Proc. Indian Acad. Sci. 3: 95. 1936.

Chroococcus minimus var. *crassus* B. Rao, Proc. Indian Acad. Sci. 3: 166. 1936.

Gloeocapsa stegophila var. *crassa* B. Rao, Proc. Indian Acad. Sci. 6: 344. 1937.

Chroococcus montanus var. *hyalinus* B. Rao, Proc. Indian Acad. Sci. 6: 345. 1937.

Gloeotheca rupestris var. *minor* Jao, Sinensia 10: 178. 1939.

Gloeotheca fuscolutea var. *unilamellaris* Chu, Ohio Journ. Sci. 52: 96. 1952.

Aphanothece Lemnae Chu, Ohio Journ. Sci. 52: 96. 1952.

Plantae aerugineae, olivaceae, luteolae, brunneae, roseae, violaceae, vel nigrae, microscopicae vel macroscopicae, (1—)pluri—multi-cellulares, cellulis in divisione binis truncato-hemisphaericis usque ad truncato-ovoideas, aetate protracta ovoideis, ellipticis, vel raro elliptico-cylindraceis, diametro (3—)4—8 μ crassis, usque ad 3-plo longiores; gelatino vaginale primum hyalino deinde lutescente vel brunnescente, homoganeo vel saepe conspicue lamelloso, nonnumquam omnino diffuente;

protoplasmate aerugineo, olivaceo, luteolo, roseo, vel violaceo, plerumque homogeneo. FIGS. 145—163.

Commonly found on soil, rocks, and wood in aerial and subaerial situations and in shallow fresh (occasionally in brackish and marine) waters, or free-floating in lakes and ponds. These plants grow equally well and rapidly in and out of the water through a wide range of environmental conditions. Dissociated spores and vegetative cells of *Nostoc* spp. in old natural and laboratory cultures often resemble cells of this species superficially. Subaerial and aerial growth-forms of *Palmogloea protuberans* (Sm. & Sow.) Kütz. are often mistaken for plants of *Coccochloris stagnina*.

Specimens examined:

NORWAY: (in a lagoon at high water mark) Bugönea in Sydvaranger, *M. Foslie* (isotype of *Polycystis litoralis* Hansg., L); Gudbrandsdalen, *N. Wille*, Sept. 1916 (S); Valdres, in rupibus ad Skogstad, *Wille*, 31 Jul. 1879 (D, S); in rupibus udis earundenique fissuris ad Nass, *H. C. Lyngbye*, 4 Jul. 1816 (Type of *Palmella rupestris* Lyngb., C; isotypes, FC [Fig. 148], FI); Saltdal, Nordland, *C. Sommerfelt* (Type of *P. obscura* Sommerf., C; isotype "e Norvegia", PC). SWEDEN: in turfosis Scaniae, *J. Agardh* (Type of *Coccochloris stagnina* β *cuprina* Kütz., FI; isotype, PC); in stagno ad Qvickjock in Lapponia Lulensi, *G. Lagerheim*, Jul. 1883 (as *C. stagnina* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1595a, L); in lacu Langen in Nericia, *O. Borge*, Jul. 1898 (as *C. stagnina* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1595b, L); in amne Fyrisan in Ultuna, Uplandia, *C. Johansson & G. Lagerheim*, Nov. 1882 (as *Aphanothece Mooreana* in Wittr. & Nordst., Alg. Exs. no. 695, FC, L, NY, S); in stagno Marestrandii, *O. Nordstedt*, Aug. 1876 (as *Coccochloris prasina* in Aresch., Alg. Scand. Exs., Ser. Nov., no. 427, FC, L, S); Lurbo, par. Näs, Uppland, *V. Witrock*, Jul. 1876 (D, S); Sjöbra, *H. W. Arnell*, Aug. 1877 (S); Stockholmen, *S. Areschoug*, May 1868 (S); Haparavida, *T. Krok*, Jul. 1868 (S); in stagno ad Bara Scaniae, *H. G. Simmons*, Sept. 1897 (S); in palude ad Kungsmarken prope Lund, *Simmons*, Jun. 1897 (S); Varberg, Halland, *D. E. Hylmø*, Apr. 1928, 1929 (S); Scania, *J. Agardh*, 1843 (DT); in insula Vermdö Uplandiae, *E. Warming & N. Wille*, Jul. 1883 (as *C. tuberculosa* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1599, NY); in spelunca "Silfvergrotten" montis Skullen Scaniae, *Simmons*, Jul. 1897 (NY); Upsala, in aquario, *Lagerheim*, Mar. 1882 (S); Transtrand, Dalarne, *Borge*, Jun. 1916 (S); ad marginem aquarii in caldario horti botanici Upsaliensis, *Lagerheim*, Mar. 1892 (as *Gloeotheca tepidarium* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1544a, L). POLAND: Silesia: in fossa ad Tscheichwitz prope Vratislaviam, *B. Schröder*, Sept. 1895 (as *Coccochloris stagnina* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1596, L); in einem Teiche an der Steinau bei Tillowitz, *O. Kirchner*, 4 Jul. 1875 (as *Aphanothece prasina* in Rabenh. Alg. no. 2442, FC, L, TA, UC); in einem Erdausstich bei Bischwitz bei Breslau, *Hilse*, Sept. 1864 (as *A. pallida* in Rabenh. Alg. no. 1831, FC, FH, NY, UC); an einem feuchten, grasigen Wege im Steinbruche auf dem Galgenberge bei Strehlen, *Hilse*, 1862 (as *Palmella testacea* in Rabenh. Alg. no. 1524, FC, L). ROMANIA: Chitila, in palude riv. Colintina, dist. Ilfov, *E. C. Teodorescu* 1319, 9 May 1903 (FC, W).

GERMANY: Baden, an den Speichen eines Wasserrades bei Constanza, *E. Stizenberger*, Aug. 1857 (isotypes of *Gloeocapsa aurata* Stizenb. in Rabenh. Alg. no. 607, FC, L, MIN, PC; and in Jack, Lein., & Stizenb., Krypt. Badens no. 1, TA, UC). Bavaria: an der Wand des feuchten Gewölbes der über den Röhelheim führenden Brücke des Donau-Mainkanales bei Erlangen, *P. Reinsch*, 26 Mar. 1864 (as *G. atrata* in Rabenh. Alg. no. 1914, FC, L, S); Kersbach bei Erlangen, *Glück*, Sept. 1890 (L, NY, S), *Reinsch* (D, L). Brandenburg: an einer feuchten Mauer in Warmhaus des Oberhofbuchdruckers Decker zu Berlin, *A. Braun*, Jul., Oct. 1852 (Type of *G. tepidarium* A. Br. in Rabenh. Alg. no. 221, L; isotypes, FC [Fig. 157], PC, TA), Aug. 1852 (PC); in Warmhaus des Universitätsgartens zu Berlin, *Braun*, Oct. 1875 (Type of *Gloeotheca decipiens* A. Br. in Rabenh. Alg. no. 2456, L; isotypes, FC, PC, S, TA); im Berliner botanischen Garten, *Braun*, Aug. 1852 (L), Jan. 1855 (L), Jan. 1875 (L), Apr. 1875 (as *G. decipiens* in Rabenh. Alg. no. 2456b, FC [Fig. 149], L, PC, S, TA), May 1875 (S), May 1879 (S), *P. Hennings*, Apr., May 1892 (as *G. decipiens* in Henn., Phyk. March. no. 45, L); Berliner Treibhäuser, *Anon.*, Aug. 1863 (FH, S); im Tümpeln bei Weissensee unweit Berlin, *Braun*, Aug. 1863 (Type of *Aphanothece prasina* A. Br. in Rabenh. Alg. no. 1572, FC [Fig. 161]), *A. de Bary*, Aug. 1851 (as *Coccochloris stagnina* in Rabenh. Alg. Suppl. no. 3, L), *Bauer*, Aug. 1854 (FH, L); Berlin, *A. Braun*, Aug. 1851 (L, NY), Aug. 1863 (L, S); Berliner bot. Garten, *P. Magnus*, Jun. 1896 (S); Tümpel bei Schönborn, *A. Jenks*, Aug. 1892 (TA); Friedrichsfelde,

Jahn, Jul. 1856 (TA); Halensee und Hundekohlensee im Grunewald, P. Hennings, May, Jun. 1892 (as *C. stagnina* var. *prasina* in Henn., Phyk. March. no. 42, FH, L). HESSE: Bessungen bei Darmstadt, G. Martens (L); fontaine du jardin grandducal à Darmstadt, Martens (L); im Schlossgarten zu Darmstadt, A. Braun 23, Sept. 1853 (L); Darmstadt, Braun, 1851 (L). Mecklenburg (Pomerania): Wolgast, M. Marsson (NY). Saxony: Leipzig, Reuter (NY, UC); bei Auerbach in Voigtlande, P. Richter (UC); in Tümpeln bei Riesigk, Wörlitz (Anhalt), R. Haritz, Jun. 1890 (S); in piscinis ad Lipsiam et Dresdam, Welwitsch (S); in einem Teiche um Lübschütz bei Wurzen unweit Leipzig, H. Reichelt, Jun. 1886 (as *C. stagnina* var. *prasina* in Hauck & Richt., Phyk. Univ. no. 91, L, MICH, MIN, S); Nordhausen, F. T. Kützing (Type of *Protococcus minutus* Kütz., L[Fig. 145]; isotype, UC); an nassen Felsen des Innerstehals im Oberharze, Römer 154 (Type of *Palmella pallida* Kütz., L; isotype, UC); Halle, Kützing (D, L); in stehenden Wässern bei Halle, Kützing (as *Coccochloris stagnina* in Kütz., Alg. Aq. Dulc. Dec., no. 29, FC, L, NY, UC); (in lacubus ad Dieskau) K. Sprengel (Type of *C. stagnina* Spreng., FC[Fig. 154]); Dresden, an der Wand eines Gewächshauses in Prinz Georg's Garten, C. A. Hamitzsch (as *Gloeocapsa muralis* in Rabenh. Alg. no. 1216, FC, L, PC); Pillnitz, Welwitsch (BUT); im Schlossgarten bei Pillnitz, L. Rabenhorst (Type of *Aphanothece coerulescens* A. Br., as *Coccochloris stagnina* in Rabenh. Alg. no. 3, L; isotypes, FC, TA, UC); Mauerwände in einem Warmhause, Connewitz, Leipzig, P. Richter, Apr. 1879 (FC); ad parietes caldari in Connewitz prope Lipsiam, Richter, 21 Apr. 1880 (as *Gloeotheca decipiens* in Wittr. & Nordst., Alg. Exs. no. 594, D, FC, L, S); an feuchten Wänden eines Gewächshauses, Anger bei Leipzig, Richter (FC, S), Feb. 1884 (as *Gloeocapsa arovirens* in Hauck & Richt., Phyk. Univ. no. 42, L, PC), 12 Apr. 1881 (as *G. decipiens* with *Chroococcus varius* in Wittr. & Nordst., Alg. Exs. no. 600, FC); an dem Mauerwerk der Treibgärtnerei, Planitz, G. Kreischer (designated as Type of *Gloeocystis rupestris* Rabenh. in Rabenh. Alg. no. 1790, FC; isotype, PC). Schleswig-Holstein: ex lacu prope Slesviciam, J. N. Subr. 26 May 1846 (FC, S); ad Slesviciam, C. Jessen (FC, L, S); Megger Koog in Schleswig, Jessen (FC, FH, L, S); in Torfgruben bei Waldhausen unfern Lübeck, R. Häcker (as *Coccochloris stagnina* in Rabenh. Alg. Suppl. no. 3, L, UC). Thuringia: an feuchten Felsen unterhalb des Breitenegscheid, Eisenach, W. Migula, Sept. 1905 (as *Gloeotheca rupestris* in Mig., Crypt. Germ., Austr., & Helv. Exs., Alg. no. 99, MICH, NY, TA); an feuchten Felsen an der Strasse nach der hohen Sonne, Eisenach, Migula, 26 Sept. 1924 (as *Aphanothece Naegeli* in Mig., Crypt. Germ. Austr., & Helv. Exs., Alg. no. 179, FC, TA); an feuchten Felsen in der Ludwigsklamm, Eisenach, Migula, July, 1932 (as *A. Castagnei* in Mig., Krypt. Germ., Austr., & Helvet. Exs., Alg. no. 278, FC, TA).

CZECHOSLOVAKIA: Moravia: kultura na agaru, Trebic, F. Nováček, 7 Oct. 1928 (FC); serpentin, roklo, Mohelno, Nováček, 10 Mar. 1926 (FC). Slovakia: in einem feuchten Sandsteinfelsen in Wallendorfer Wald, C. Kalkbrenner (Type of *Gloeotheca carpathica* Grun., W); murs humides, Wallendorf, Kalkbrenner (as *Gloeocapsa nigra* in Roumeguère, Alg. de Fr. no. 1041, L). Bohemia: Arnau, A. Hansgirg, Jul. 1885 (FC, W); Bystric nächst Beneschau, Hansgirg, Aug. 1884 (FC, W); Choroviny u Tábora, Hansgirg, Aug. 1888 (FC, W); Labská Tynice, Hansgirg, 1891 (FC, W); in saxis madidis ad Libsic, Hansgirg, Oct. 1886 (Type of *Chroococcus montanus* Hansg., W; isotype, FC[Fig. 150]); in lacu silvatico prope Neu-Strežmir ad Stupic, Hansgirg, 10 Sept. 1884 (as *Aphanothece stagnina* in Wittr. & Nordst., Alg. Exs. no. 794, FC, L, S, UC; and in Kerner, Fl. Exs. Austro-Hung. no. 2000, L, MO, S); Praha, Spolec. Zahrada, Hansgirg, Dec. 1883 (FC, W); ad Slichov prope Pragam, Hansgirg, May 1885 (FC, W); Hortus Botanicus, Smichov, Hansgirg, Dec. 1883, Jan. 1884, Feb. 1884, Jul. 1886 (FC, W); skaly groti, Srbsku u Berouna, Hansgirg, Aug. 1884 (FC, W); Stechovic nächst Prag, Hansgirg, Apr. 1887 (FC, UC); in rupibus subhumidis ad St. Kilian prope Stechovic, Hansgirg (as *A. pallida* in Kerner, Fl. Exs. Austro-Hung. no. 1999, L, MO, S); Stresmir u Stupsice, Hansgirg, Aug. 1884 (FC, W); Steinkirchen ad Budweis, Hansgirg, Aug. 1888 (FC, W). AUSTRIA: Lower Austria: in rupibus humidis prope Frankenfels, S. Stockmayer (as *Gloeotheca fusco-lutea* in Mus. Vindob. Krypt. Exs. no. 148, FC, L, S); Tümpel in den Auer bei Marchegg, G. de Beck, Aug. 1887 (FC, W); Wien, in tepidariis horti botanici universitatis, K. Reebinger (as *G. tepidarium* in Mus. Vindob. Krypt. Exs. no. 2138, S). Styria: an Moosen in einem Mühlgange der Mürz in Kindberg, C. Heusler, 11 Jul. 1856 (Type of *Gloeotheca Heusleri* Grun., W); Judendorf-Gratwein prope Graz, A. Hansgirg, Sept. 1890 (FC, W). Carinthia: Kalkfelsen, Vorrnach, Kreuzekgebiet, H. Simmer, May 1898 (S); Klagenfurt, Hansgirg, Sept. 1889 (FC, W); Feldkirchen prope Villach, Hansgirg, Sept. 1889 (FC, W). Tyrol: Brixlegg, Hansgirg, 1891 (FC, W). HUNGARY: Budapest, in vitrinis caldarium horti botanici, F. Filárszky (as *Gloeocapsa fenestralis* in Mus. Vindob. Krypt. Exs. no. 433, FC, L, S, Z). JUGOSLAVIA: Slovenia: St. Georgen—Pölschach, Podnart, and Krainburg, Hansgirg, Aug. 1889 (FC, W); Marburg, Cilli, and Steinbrück, Hansgirg, Aug. 1890 (FC, W). TRIESTE: Zaule—Capo d'Istria, Hansgirg, Aug. 1889 (FC, W).

SWITZERLAND: an nassen Felsen, Luzern, C. von Nägeli, Dec. 1847 (Type of *Gloeotheca devia* Näg., with *Scytonema* sp., ZT); Dübendorf, auf dem Grunde in wenig tiefen Gruben, Nägeli, Feb. 1849 (ZT); Thalwerk, C. Cramer, Apr. 1863 (ZT); St. Gallen (MICH); auf Moosen, Zweibrücker Tobel bei St. Gallen, B. Wartmann (as *G. fuscolutea* var. *holochroa* in Wartm. & Wint., Schweiz.

Krypt., no. 847, ZT), 15 Jul. 1860 (Type of *Aphanothece Naegelii* Wartm. in Wartm. & Schenk, Schweiz. Krypt. no. 36, ZT; isotypes in Rabenh. Alg. no. 1093, FC [Fig. 147], FH); an Nagelfluhfelsen der Bernegg bei St. Gallen, Wartmann (as *Gloeothece rupestris* in Wartm. & Wint., Schweiz. Krypt. no. 846, ZT); feuchte Felsen, Küsnacht, Zürich, Nägeli 368, Nov. 1847 (Type of *Gloeocapsa fuscolutea* α *achroa* Näg., β *holochroa* Näg., and γ *bemichroa* Näg., L; isotypes, M, ZT); ad terram inter muscos, Zürich, G. Winter, May 1878 (TA); Küsnachter Wasserfall um Zürich, Nägeli (PC); feuchte Felsen, Küsnacht, Zürich, Nägeli 258 (Type of *G. Kuetzingiana* Näg., L; isotypes, M, O, UC), Nov. 1847 (FC [Fig. 159], M); Küsnacht bei Zürich, B. Wartmann, 28 Jul. 1856 (as *G. Kuetzingiana* in Rabenh. Alg. no. 630, FC, L, M, PC; and in Wartm. & Schenk, Schweiz. Krypt. no. 133, M, Z). ITALY: Sagrado prope Görz, A. Hansgirg, 1891 (FC, W); sui muri delle serre dell'Orto Botanico di Pisa, A. Mori (as *G. muralis* in Erb. Critt. Ital., ser. II, no. 1245, FC, PC); Oliero, ex herb. Zanardini (Type of *Microcystis paroliniana* Menegh., FI [Fig. 152]; isotype, PC); margine della fontana di Viali in Euganeis, G. Meneghini, Aug. 1841 (Type of *Microcystis microspora* Menegh., FI; isotypes, L, S, UC); St. Elena prope Battaglia, Meneghini (Type of *Gloeocapsa thermalis* Kütz., L); with *Scytonema thermale*, Abano, in herb. Kützing (Type of *Protococcus julianus* Kütz., L); in canalibus ubi effluit aqua calida thermarum ad Battaglia, F. T. Kützing, May 1835 (Type of *Palmella bulbosa* Kütz., L; isotypes in Kütz., Alg. Aqu. Dulc. Dec. no. 154, L, UC); Abano, G. Meneghini (Type of *Gloeocapsa gelatinosa* β *aeruginosa* Kütz., L; isotypes, S, UC); in aqua thermali, Battaglia, Meneghini (Type of *G. gelatinosa* Kütz., L [Fig. 163]; isotypes, S, UC); in aquis thermalibus Aponi, Meneghini (Type of *Microcystis gelatinosa* Menegh., FI; isotypes, PC, UC).

NETHERLANDS: Goës, van den Bosch 365 (UC); den Haag, in Slotte, Vrijdagsijnen (L); Delft, warme kas van het Laboratorium voor Technische Botanie, A. J. Meesse, Apr. 1943 (L); Delft, cultuurruin, G. van Rossem, Oct. 1942 (L); Botshol bij Abcoude, V. Westhoff, Jul., Aug. 1944 (L); Heemstede, Groenendaal, P. Leeuenaar, May 1937 (L); Groeneveld, A. Weber-van Boise 1216, Apr. 1893 (L); Nieuwkoop, verbinding van Oosthout van de Wijde met Kaarwetering, Westhoff 96, Sept. 1943 (L); plassen van Brenkleven en Tienhoven, W. Vervoot, May 1942 (L); Westbroek, in Sloot, R. A. Maas Geesteranus & Westhoff 2762, Aug. 1943 (L), Maas Geesteranus 2764 (L); Kaloot near Borsele, Zeeland, W. G. Beefink, 2 Aug. 1950 (FC); Hortus Botanicus, Leiden, J. T. Koster 19, 24 Oct. 1935 (D, L). BELGIUM: dans les fossés le long de la route de Gand à Tronchiennes, Scheidweiler (as *Coccolchloris stagnina* in Westend. & Wall., Herb. Crypt. Belg. no. 1099, NY, UC); Jardin Botanique de Bruxelles, E. de Wildeman, Jun. 1888 (as *Gloeocapsa polydermatica* in Roumeguère, Alg. de Fr. no. 1015, L). FAEROES ISLANDS: H. C. Lyngbye (PC). BRITISH ISLES: Scotland: in the bottom of Dunmore loch near Pitlochry, Perthshire, A. J. Brook, 5 Jan. 1954 (D). England: near Bristol, 2 Sept. 1847, herb. Thwaites (Type of *Coccolchloris cystifera* Hass., BM); Sutton Park, Warwickshire, G. S. West, 6 May 1908 (FC, UC); in small pond near River Coln at Fairford, Gloucestershire, W. L. Tolstead 8487, 1 Oct. 1944 (FC). Ireland: boggy hole by Shane's Castle near Lough Neagh, county Antrim, D. Moore (Type of *Palmella Mooreana* Harv., K [Fig. 158]; isotype, BM); in brackish pool, Clare island, A. D. Cotton, May 1911 (NY). FRANCE: Aisne: sur un mur de casemate, Berthenicourt-par-Moy, J. Mabilie 4, May 1952 (FC); forêt de St. Gobain, Mabilie, Jul., Aug. 1952 (FC). Alpes Maritimes: Antibes, E. Bornet, Mar. 1874 (FH), Jan. 1875 (NY); fond d'un ruisseau à Menton, G. Thuret (as *Aphanocapsa Roeseana* with *A. membranacea* in Roumeguère, Alg. de Fr. no. 827, L). Alsace: jardin botanique de Strasbourg, A. Braun (as *Gloeothece decipiens* in Roumeguère, Alg. de Fr. no. 520, L); fossés, St. Marie aux Mines, Caspary (as *Aphanothece stagnina* in Roumeguère, Alg. de Fr. no. 728, L); fossés aux environs de Colmar, herb. Buchinger (as *Aphanocapsa Roeseana* in Roumeguère, Alg. de Fr. No. 516, L). Calvados: Vire, herb. Lenormand (FC, D, L, S), Chauvin (L); anciennes carrières d'Allemagne, Caen, P. Frémy 737, Apr. 1924 (DT). Hérault: St. Pons, C. Flahault 396, May 1882 (L, S). Manche: Carentan (S); ad muros, Saint Lô, Frémy 319, Feb. 1921 (NY); ad rupes, Agneaux, Frémy, Jun. 1927 (NY); mare de Vauville, Frémy, 21 Aug. 1931 (as *Aphanothece stagnina* in Hamel, Alg. de Fr. no. 152, FC). Maine et Loire: rochers de Murs, F. Hy, 10 Nov. 1890, Nov. 1892 (PC), Mar. 1894 (as *Gloeothece Rabenhorstii* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1543, L, NY), Jul. 1894 (as *G. tepidarium* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1544b, L); in stagno prope St. Georges sur Loire, Hy, Jul. 1891 (as *Coccolchloris stagnina* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1596b, L). Nord: in canalibus Flandriae litoralis prope Dunkerque, C. Flahault, 14 Aug. 1885 (as *Polycystis aeruginosa* in Wittr. & Nordst., Alg. Exs. no. 795, FC, L, S); in fossis prope Bourbourg, Flahault, Aug. 1886 (as *Coccolchloris stagnina* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1597, L). Seine et Marne: ad parietes aqueductus, Meloduno, Roussel, 21 Jul. 1851 (FI). SPAIN: sobre piedras y tallos, 30 cm. de profundidad, Lago de Bañolas, prov. Gerona, R. Margalef, 7 Jul. 1944 (isotype of *Cyanostylon banyolensis* Margal., D).

CANARY ISLANDS: Funchal, C. Lindman, 7 Jan. 1885 (D, S). ICELAND: in stagnant water in a branch to Grimsá, Vallanes, East Iceland, J. Boye Petersen, 26 Jun. 1914 (FC). BERMUDA: on ground near the seashore, Hamilton, W. G. Farlow (FC, UC); on ground, Spanish Point, Farlow, Jan. 1900 (S; as *Gloeothece rupestris* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 703, FC, L, MICH, TA); on rocks near shore, F. S. Collins 7002, Apr. 1912 (FH); in a freshwater pool near Old Ferry

Road, *Collins*, 9 Aug. 1913 (as *G. rupestris* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2154, FC, D, MICH, L). NEW BRUNSWICK: Island Lake, 40—50 miles due south of Dalhousie, *M. Le Mesurier* 3, Aug. 1953 (FC); wet ground, ledges, etc., Grand Falls, *H. Habeeb* 10063, 10206, 10378, 10844, Jul., Aug. 1947, Jul., Sept. 1948 (FC, HA). MAINE: Fox island, Hunnewell's Point, mouth of the Kennebec river, *F. S. Collins*, Aug. 1880 (FC, FH, UC); lagoon, Eagle island, *Collins* 2954, Jul. 1894 (NY); on cliffs of Piscataquis river, Dover, *Collins*, 8 Jul. 1897 (FC, UC). NEW HAMPSHIRE: alpine cascade, Gorham, *W. G. Farlow*, Sept. 1887 (FH). MASSACHUSETTS: in greenhouse, Biological Institute, Harvard University, Cambridge, *R. M. Whelden & G. D. Darker* 6457, 23 Sept. 1937 (D, FH); on flower pots, Botanic Garden, Cambridge, *H. M. Richards*, 18 Feb. 1895 (as *Aphanotheca microscopica* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 552, FC, L, TA); in salt water kept in the laboratory more than a year, *Farlow*, Feb. 1911 (FC, FH); Nahant, *B. M. Davis*, May 1893 (FH); wet rocks, Pine Banks park, Melrose, *Collins* 3591, Apr. 1899 (FH, UC); cliffs, Eastern Head, Gloucester, *Farlow*, Jul. 1902 (FH); on the ground beyond the guano factory, Woods Hole, *Farlow*, Jul. 1889 (FH); shore of Herring pond, Eastham, *Collins* 5894, 5896, 5897, Aug. 1908 (NY); pond, Eastham, *Collins* 5900, Sept. 1907 (NY); Jemima pond, Eastham, *Collins*, Aug. 1908 (NY); Fay's ditch, Woods Hole, *F. Drouet* 1876, 12 Jul. 1936 (D, NY); salt marsh pools, Pasque island, Gosnold, *W. R. Taylor*, 5 Jul. 1932 (D, TA); rocks, Essex street, Saugus, *Collins* 1696, Jun. 1890 (UC); Tashmoo pond, Marthas Vineyard, *G. T. Moore*, Sept. 1907 (FH); Naushon island, *Taylor*, Jul. 1917 (TA); Salt pond, Falmouth, *H. T. Croasdale*, Jul. 1935 (TA); pond southeast of Oyster pond, Falmouth, *Taylor*, Jul. 1925 (TA); Fresh pond, Cambridge, *W. Trelease*, Oct. 1881 (MO); Stony Brook pond, *G. T. Moore*, Oct. 1895 (MO). RHODE ISLAND: *W. J. V. Osterhout*, 1894 (FH).

CONNECTICUT: shore of Fresh pond, Stratford, *I. Holden* 729, Sept. 1892 (UC); Norwich, *W. A. Setchell*, 2 Sept. 1892 (as *Aphanotheca prasina* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 251, FC, L, TA, UC); in a small pond, Norwich, *Setchell* 31, Jul. 1885 (UC); in a pool on Derby avenue, New Haven, *Setchell* 574, 1 Oct. 1892 (UC); Tyler lake, Litchfield county, *H. K. Phinney* 1122, 4 Sept. 1946 (FC, PHI); in a temporary pool at the head of the lake in the Yale bird preserve, New Haven, *Phinney* 1074, 28 Jul. 1946 (FC, PHI); in pond, New Haven, *D. C. Eaton*, Oct. 1880 (D, YU); in a jar in the laboratory, Yale University, New Haven, *Setchell* 737, 10 Nov. 1893 (FC, UC). QUEBEC: Grenville, Argenteuil county, *J. Brunel* 304, 25 Jun. 1931 (FC); Rawdon, Montcalm county, *S. M. J. Eudes* 253-7 (FC); on wet calcareous cliff on Mount Royal, Montreal, *Brunel* 457, 18 Sept. 1937 (FC); Ile du Large dans le fleuve St. Laurent entre Longueuil et Boucherville, *J. Brunel* 64, 11 Sept. 1930 (FC, D); in an aquarium, McGill University, Montreal, *R. D. Gibbs*, Oct. 1950 (FC); sur rocher humide, embouchure de la Kogaluk, baie d'Hudson, *J. Rousseau* 209, 16 Jul. 1948 (FC). NEW YORK: in the greenhouse, Barnard College, New York City, *H. C. Bold* B23, Feb. 1941 (FC); on rocks and walls, Felter's Glen and gorge below Rensselaerville, *M. S. Markle* 16, 30, 28 Jul. 1946, Jul. 1947 (EAR, FC); Queechy lake, Canaan, *E. S. Deevey*, 7 Jun. 1937 (D, DT, NY, S); in Hidden lake, Indian Falls, Genesee county, *J. Blum* 127, 4 Oct. 1948 (FC); in Hundred Acre pond, Mendon Ponds, Monroe county, *Blum* 407, 15 Oct. 1949 (FC); on dripping rocks along Genesee river, Glen Iris, north of Portageville, Wyoming county, *Blum* 296, 1 Jun. 1949 (FC). PENNSYLVANIA: [prope Philadelphia] "coll. Dr. Wood misit Billings" (Type of *Palmella Jesenii* Wood in herb. Princeton University, NY); greenhouses [Bethlehem?], *F. Wille* (NY); aquarium, greenhouse, University of Pennsylvania, Philadelphia, *F. R. Fosberg & Drouet* 2199, Mar. 1938 (D); on wet rocks, Silverthread falls, Dingmans Ferry, *Drouet & H. Herpers* 3670, 16 Jul. 1941 (FC). MARYLAND: in rock pool, Plummers island in the Potomac river near Cabin John, Montgomery county, *E. C. Leonard* 3071, 1 Nov. 1953 (FC, US); pool, Cove Point, Calvert county, *H. C. Bold* 8, 1936 (FC).

VIRGINIA: on dripping rocks by spring northeast of Warm Springs, Bath County, *E. S. Luttrell & J. C. Strickland* 942, 26 Jul. 1941 (FC, ST); on wet soil near railroad at Ivey road west of Charlottesville, *B. F. D. Runk & Strickland* 560, 13 Nov. 1939 (FC, ST); on rocks in stream below cave at Goodman's Ferry, Giles county, *Strickland* 527, 16 Aug. 1939 (FC, ST); concrete spring mask, Old Mill near Newport, Giles county, *H. Silva* 2776, 26 Jun. 1953 (FC, TENN); dripping sandstone in woods west of Fredericksburg, *H. H. Iltis* V2, 26 Dec. 1947 (FC, TENN); in pool and on wet soil, Back Bay national wild-life refuge, Princess Anne county, *H. A. Bailey, Luttrell, & Strickland* 782, 784, 1 Jul. 1941 (FC, ST). WEST VIRGINIA: on cliff east of Stollings, Logan county, *A. T. Cross*, 14 Nov. 1943 (FC); seepage from a limestone quarry near Athens, Mercer county, *E. M. McNeill* 216, 9 Nov. 1944 (FC). NORTH CAROLINA: on wood flume of waterwheel, Cherokee, Swain county, *H. Silva* 1713, 13 Aug. 1949 (FC, TENN); freshwater pond on Shackleford Banks, Beaufort, *H. J. Humm* 5, 11 Sept. 1947 (FC); outlet draining a salt marsh, Hatteras, Dare county, *L. G. Williams* 2a, 12 Jul. 1949 (FC); on moist soil at 924 Urban avenue, Durham, *F. A. Wolf*, 1 Oct. 1946 (FC); on wet cliffs, Jackson county, *H. C. Bold* H29, 7 May 1939 (FC); on rocks, White Oak and Otter creeks, Macon county, *Bold* H204a, H209, 27 Jun. 1939 (FC); on overhanging rocks below Dry Falls, Highlands, Macon county, *Bold* H219, 29 Jun. 1939 (FC). SOUTH CAROLINA: Easttote river, Pickens county, *Bold* H261, H271, Jul.

1939 (FC); Walhalla tunnel, Waihalla, Oconee county, *Bold* H126, H126b, 12 Jun. 1939 (FC). GEORGIA: on wet rocks, Tallulah Gorge, Rabun county, *Bold* H296, 5 Jul. 1939 (FC). FLORIDA: Gainesville, *M. A. Brannon* T, 369, 384, 399, Jul.—Oct. 1946, 1947 (FC, PC); mangrove swamp south of South lake, Hollywood, Broward county, *F. Drouet* 10302, 29 Dec. 1948 (FC); in a depression in sand dunes west of Eastpoint, Franklin county, *Drouet & C. S. Nielsen* 10960, 16 Jan. 1949 (FC, T); wall of canyon, Aspalaga, Gadsden county, *J. E. Harmon* 7, 4 Nov. 1950 (FC, T); Florida Caverns state park, *Florida State University* class, 28 Jul. 1952 (FC, T); Deep Lake, Lee county, *R. Patrick* 10, 31 Dec. 1937 (D, FH, PENN, UC); region of Hendry Creek about 10 miles south of Fort Myers, *P. C. Standley* 73187, 73448, 73467, 73481, Mar. 1940 (FC); Bonita Beach, Lee county, *Standley* 92791, 10 Mar. 1946 (FC); limestone, Jackson Bluff, Leon county, *C. Jackson*, 9 Nov. 1950 (FC, T); Natural Well, northeast of Woodville, Leon county, *Nielsen, G. C. Madsen, & D. Crowson* 590, 30 Oct. 1948 (FC, T); pool, Teatable Key, *L. B. Isham* 19, 1 Jul. 1952 (FC); Everglades national park, *Isham* 12, 1952 (FC); hammock 1 mile northeast of Bear Lake trail, Everglades national park, *D. Blake & R. Hauke*, 3 Feb. 1953 (FC, T); buttonwood swamps northwest and northeast of Inn, Big Pine key, Monroe county, *E. P. Killip* 41684, 41931, 41944, Jan.-Feb. 1952 (FC, US); depression in sand dunes east of Pensacola Beach, *Drouet, Nielsen, Madsen, Crowson, & A. Pates* 10594, 8 Jan. 1949 (FC, T); in the lane leading to the wharf in St. Marks river, Port Leon, Wakulla county, *Drouet & E. M. Atwood* 11452, 26 Jan. 1949 (FC, T).

ONTARIO: on wet stonework in greenhouse, University of Toronto, *W. R. Watson* (FH), in a culture jar, Oct. 1937 (FH). OHIO: Adams county: on wet cliff, Beaver pond, *L. Lillick & I. Lee* 88, 29 Apr. 1933 (FC, DA). Athens county: state hospital ponds, Athens, *A. H. Blicke*, 3 Oct. 1940 (FC, DA); near Canaanville, *Blicke*, Jul. 1941 (FC, DA); sandstone on Wilson's Farm near Athens, *W. A. Daily* 130, 7 Oct. 1939 (FC, DA). Coshocton county: rocks at Butternut falls, North Appalachian Experimental Watershed, *L. J. King* 718, 1027, 1037, 26 Aug. 1942, 30 May 1943 (EAR, FC). Cuyahoga county: sandstone cliff, Olmsted falls, Olmsted, *W. A. & F. K. Daily* 564—566, 568—572, 26 Jul. 1940 (FC, DA). Erie county: quarry pool, Kelley's Island, *L. H. Tiffany*, 18 Jun. 1931 (D); on soil, Kelley's Island, *C. E. Taft* (FC, DA). Fairfield county: on sandstone at "B. I. S.", *J. Wolfe*, 20 Oct. 1935 (FC, DA). Greene county: on moist limestone cliff, Clifton Gorge, *M. Britton*, 3 Apr. 1937 (FC, DA). Hamilton county: soil near pond, Addyston, *W. A. & F. K. Daily* 167, *W. A. Daily* 171, 345, 346, 19 Oct. 1939, 20 Jun. 1940 (DA, FC); wet stone wall under bridge near Addyston, *J. H. Hoskins* 705, 23 Sept. 1933 (DA, FC); greenhouse, University of Cincinnati, *L. Lillick* 605, Mar. 1934 (DA, FC), *Daily* 735—739, 9 Sept. 1940 (DA, FC); on flower pot in Lakeview greenhouse, Cincinnati, *Daily* 435, 8 Jul. 1940 (DA, FC); cement wall, Peterson's greenhouse, Cincinnati, *Daily* 285, 439, 443, 444, 847, 23 Apr., 9 Jul. 1940, 11 Jan. 1941 (DA, FC); Burnet Woods, Cincinnati, *Daily* 105, 306, *Daily & R. Kosanke* 342, 1 Oct. 1939, 7 & 19 Jun. 1940 (DA, FC); rocks in Eden Park conservatory, Cincinnati, *Daily* 180, 183, 24 Oct. 1939 (DA, FC); on ground and cement walls, reservoir, Eden Park, Cincinnati, *Daily* 411, 413, 414, 3 Jul. 1940 (DA, FC). Highland county: on rock, Cave canyon, Seven Caves, Paint, *W. A. & F. K. Daily* 315, 16 Jun. 1940 (DA, FC). Hocking county: sandstones, Old Man's Cave state park, *W. A. & F. K. Daily* 515, 531, 542, 551, 27 Jul. 1940 (DA, FC); sandstone overhang, Cantwell Cliffs, *W. A. & F. K. Daily* 689, 31 Aug. 1940 (DA, FC). Ottawa county: quarry near Marblehead, Catawba island, *W. A. & F. K. Daily* 577, 591, 25 Jul. 1940 (DA, FC). Vinton county: cliffs 5 miles east of McArthur, *Daily* 121, 7 Oct. 1939 (DA, FC), *Blicke & Kosanke*, 10 Jun. 1940 (DA, FC).

KENTUCKY: jar of water and flowerpot in greenhouse, Lexington, *B. B. McInteer* 1043, 1136, 19 Sept. 1939, 26 Sept. 1940 (DA, FC); on rock ledge, Natural Bridge, Powell county, *Daily* 272, 14 Apr. 1940 (DA, FC); limestone, Slade, Powell county, *Daily, A. T. Cross, & Tucker* 744—746, 748—753, 755, 757, 760, 5 Sept. 1940 (DA, FC); at and near Sky Bridge, Powell county, *Daily, Cross & Tucker* 825, 827, 829, 830, 834, 836, 6 Sept. 1940 (DA, FC); sandstone, Torrent, Wolfe county, *W. A. & F. K. Daily & R. Kosanke* 477, 487, 14 Jul. 1940 (DA, FC); sandstone, Tight Hollow near Pine Ridge, Wolfe county, *Daily, Cross, & Tucker* 782, 6 Sept. 1940 (DA, FC), *Daily* 839a, 5 Oct. 1940 (DA, FC). TENNESSEE: in microcosm, aquarium, and greenhouse, University of Tennessee, Knoxville, *H. Silva* 1708, 1709, 2346b, 11 Aug. 1949, 9 Sept. 1950 (FC, TENN); rocks around spring, Summertown, Lawrence county, *Silva* 1066, 29 Jun. 1949 (FC, TENN); Dosters Cave no. 2 and Bellamy Cave, Montgomery county, *Silva* 1401a, 1868, 15 Jul. 1949 (FC, TENN); wet dam wall, Cumberland Springs, Moore county, *Silva* 1034, 29 Jun. 1949 (FC, TENN); mud by roadside slough west of Union City, Obion county, *Silva* 2248, 14 Jun. 1950 (FC, TENN); wet rocks, Greenbrier Cove and Ramsey Cascade, Sevier county, *Silva* 358, 413, 24 Nov., 29 Dec. 1946 (FC, TENN); aquarium, State Teachers College, Johnson City, Washington county, *Silva* 458, 14 Jan. 1947 (FC, TENN); Little River Gorge, Sevier county, *A. J. Sharp* 4115, 4116, 8 Sept. 1941 (FC, TENN); on dripping rocks near Gatlinburg, *R. F. Smart*, 21 Aug. 1938 (FC, ST); greenhouse, Vanderbilt University, Nashville, *H. C. Bold* 9, 5 Oct. 1936 (FC). MICHIGAN: on *Stereodon* sp., Mackinac island, *G. E. Nichols*, 9 Aug. 1930 (D, NY, YU); on ground, Warren Dunes, Berrien county, *G. E. Scharf*, 12 Oct. 1946 (FC); Sodon lake west of Bloomfield

Hills, Oakland county, *S. A. Cain*, 9 Dec. 1947 (FC); Lake Ann Louise on highway M77, Schoolcraft county, *H. K. Phinney 9m41/16-1*, 19 Jul. 1941 (FC, PHI); roadside ditch 1.5 miles north of Mackinaw City, Cheboygan county, *W. L. Culbertson* 830, 9 Jul. 1951 (FC); Mud lake, Yankee Springs, Hastings, *G. T. Velasquez* 14, 4 Aug. 1936 (D); Walnut lake, Oakland county, *T. L. Hankinson*, 6 May 1906 (as *Aphanotbece stagnina* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1302, FC, L, TA).

INDIANA: limestone cliff, Clifty Falls state park, Jefferson county, *W. A. & F. K. Daily* 669, 4 Aug. 1940 (DA, FC); on rock below dam in Muscatuck river at North Vernon, Jennings county, *F. K. & W. A. Daily* 911, 23 May 1942 (DA, FC); Nicoson Quarry pond southwest of Alexandria, Madison county, *F. K. & W. A. Daily* 2655, 23 Aug. 1953 (DA, FC); in jar, Butler University, Indianapolis, *C. M. Palmer* 98, 8 Dec. 1926 (DA, FC), *Daily* 235, 24 Nov. 1939 (DA, FC); Riverside fish hatchery ponds, Indianapolis, *Palmer* 72, 4 Aug. 1931 (D, DA, FC), *F. K. & W. A. Daily* 1570, 18 Aug. 1946 (DA, FC); in Lost lake, Culver, Marshall county, *F. K. & W. A. Daily* 1514, 1522, 1523, 3 July 1946 (DA, FC); stone tank in greenhouse, Bloomington, *Palmer* 150, Jan. 1934 (D); Cree lake, 4 miles north of Hendersonville, Noble county, *F. K. & W. A. Daily* 1913, 11 Sept. 1947 (DA, FC); at falls, McCormicks Creek state park, Owen county, *F. K. & W. A. Daily* 1831, 1833—1835, 10 Aug. 1947 (DA, FC); Turkey Run state park, Parke county, *Palmer* 12, 25 Jul. 1931 (DA, FC), *F. Drouet & D. Richards* 2469, 16 Jun. 1939 (FC), *F. K. & W. A. Daily & G. Plummer* 1868, 1875, 16 Aug. 1947 (DA, FC); wet limestone in quarry, St. Paul, Shelby county, *F. K. & W. A. Daily* 1171, 3 Oct. 1943 (DA, FC); Lime lake, adjacent to Lake Gage, 8.5 miles northwest of Angola, Steuben county, *F. K. & W. A. Daily* 2468, 18 Jun. 1951 (DA, FC); in aquaria and laboratory jars, Terre Haute, *B. H. Smith* 4, 25, 26, 93, 96, 228, 229, Apr. 1928—Dec. 1929 (DA, FC); laboratory cultures, Earlham College, Richmond, *M. S. Markle* 2, 3, 5a (DA, EAR, FC), 1947 (FC), *L. J. King* 2326, 2327, Aug. 1944 (EAR, FC); in School street gravel pit west of Richmond, *King* 12, 9 Jul. 1940 (EAR, FC); moist rock under Elk falls near Richmond, *King* 209, 8 Sept. 1940 (EAR, FC).

WISCONSIN: slough, Arbor Vitae lake, Vilas county, *G. W. Prescott* 2W254, 9 Jul. 1937 (D), *Prescott* 3W25, 8 Aug. 1938 (FC); Mountain lake, *C. Juday* 3W1, 31 Jul. 1938 (FC); wet soil in swamp, Two Rivers, Manitowoc county, *H. C. Benke* 6295, 15 Sept. 1944 (FC). ILLINOIS: greenhouse, Northwestern University, Evanston, *K. Damann*, 12 Mar. 1939 (FC), *H. K. Phinney*, Nov. 1943 (FC, PHI); tank in greenhouse, University of Chicago, *L. J. King*, 20 Jan. 1941 (FC), *K. C. Fan* 10600, 27 Aug. 1954 (D); tanks in greenhouse, Garfield park, Chicago, *J. A. Steyermark*, *C. Shoop*, & *Drouet* 2444, 30 Oct. 1938 (FC); culture in Chicago Natural History Museum, *F. A. Barkley* 151115, 24 Aug. 1945 (FC); on clam shells in a field west of Fox river in the north part of Geneva, Kane county, *Drouet & H. B. Louderback* 5405, 24 Jun. 1944 (FC); in a depression in the sand dunes, Dunes state park, Lake county, *Drouet*, *P. C. Standley*, & *Steyermark* 3515, 14 Jun. 1940 (FC, FH); pond, Charleston, Coles county, *E. N. Transeau*, Nov. 1910 (NY). MISSISSIPPI: wet ground beside the freshwater reservoir in the western part of Gulfport, Harrison county, *Drouet & R. L. Caylor* 9943, 12 Dec. 1948 (FC). MINNESOTA: on cement wall, Minnehaha creek, Minneapolis, *K. Damann*, 28 Aug. 1936 (FC); Itasca state park, *R. Staub*, 5 July 1954 (D), *K. C. Fan* 10255, *Drouet & Fan* 11878, *Drouet*, *T. Morley & Fan* 11896, *Drouet* 12045, 12074, Jun. 1954 (D, MIN); in tank, University of Minnesota, Minneapolis, *J. E. Tilden*, Mar. 1909 (as *Gloeocapsa arenaria* in Tild., Amer. Alg. no. 650, FC). MISSOURI: in Chinn's lake, 17 miles west of Columbia, in Howard county, *J. R. Hurt* C1, 1939 (FC); on mud in small pool by stream, Thayer, Oregon county, *N. L. Gardner* 1410, Jul. 1904 (FC, UC). LOUISIANA: in ditch, Louisiana State University campus, Baton Rouge, *G. W. Prescott* La13, 18 Jun. 1938 (FC); barren ground behind Broussard's Beach on the Gulf of Mexico east of Cameron, *Drouet* 8823, 8881, Nov. 1948 (FC); in a drying pool on a road-embankment in the marsh between the arms of the Calcasieu river west of Cameron, *Drouet* 8866, 3 Nov. 1948 (FC); Jefferson Island, Iberia parish, *R. P. Ehrhardt & Drouet* 28, 12 Nov. 1948 (FC); on a shell ridge between Leveille and Chenier Caminada, Lafourche parish, *Drouet & P. Viosca Jr.* 9447, 26 Nov. 1948 (FC); pool at "Singing Waters", Holden, Livingston parish, *L. H. Flint*, 4 Oct. 1946 (FC); on an embankment, U. S. highway no. 90 east of the road to Chalmette, Orleans parish, *Drouet & Viosca* 9350, 24 Nov. 1948 (FC); in a pond, Little Lake Club, Plaquemines parish, *J. N. Gowanloch*, Sept. 1944 (FC); in a ditch entering Bayou du Large just north of Theriot, Terrebonne parish, *Drouet* 9287, 22 Nov. 1948 (FC).

NEBRASKA: low ground, Beeken lake south of Arthur, Arthur county, *W. Kiener* 21030, 5 Jul. 1946 (FC, KI); culture from floodplain pond of Platte river south of Kearney, Buffalo county, *Kiener* 16496d, 6 Nov. 1945 (FC, KI); sandy soil, Platte river floodplain north of David City, Butler county, *Kiener* 21575, 8 Nov. 1946 (FC, KI); soil in grassland west of Champion, Chase county, *Kiener* 10620, 31 Jul. 1941 (FC, KI); in Dewey lake, Cherry county, *E. Palmatier & T. R. Porter* 13774a, 28 Jun. 1936 (FC, KI); soil at edge of gravel pit, Fremont, Dodge county, *Kiener* 23919, 1 Jul. 1948 (FC, KI); wet sand, sand pit lakes, Fremont, *Kiener* 19330a, 14648, 14650, 23 Apr., 23 Jul. 1943 (FC, KI), and laboratory culture, *Kiener* 21475b, 15 Feb. 1947 (FC, KI); Twin

lakes, northwest of Benkelman, Dundy county, *Kiener* 21224, 30 Jul. 1946 (FC, KI); grassland 5 miles north of Haigler, Dundy county, *Kiener* 10498, 25 Jul. 1941 (FC, KI); wet ground near Grand Island, *Kiener* 15123, 28 Aug. 1943 (FC, KI); wet meadow, Palisade, Hayes county, *Kiener* 10828, 5 Aug. 1941 (FC, KI); bank of Elkhorn river west of O'Neill, Holt county, *Kiener* 11210, 21 Aug. 1941 (FC, KI); culture from spring, Loneragan creek, Lemoyne, Keith county, *Kiener* 23075a, 20 Aug. 1948 (FC, KI); low ground, Lincoln, *Kiener* 9734, 11 Dec. 1940 (FC, KI); on limestone, University greenhouse, Lincoln, *Kiener* 13627, 16 Jan. 1943 (FC, KI); swampy soil 10 miles north of North Platte, *Kiener* 17525, 1 Sept. 1944 (FC, KI); cultures from creek south of Gretna, Sarpy county, *Kiener* 13686, 13686c, 16 Jul., 11 Aug. 1944 (FC, KI). TEXAS: Clear lake, Harris county, *H. K. Phinney* 4T41/3b, 3 Sept. 1941 (FC, PHI); on sand at Blind bayou, Galveston island, *Phinney* 2T41/2, 30 Aug. 1941 (FC, PHI); moist sinkhole, Granite mountain, 2 miles north of Marble Falls, Burnet county, *F. A. Barkley & H. V. Copeland* 8, 25 Jul. 1946 (FC, TEX); permanent pool, Austin, *Barkley* 44alg23, 25 Jul. 1944 (FC, TEX). WYOMING: in swamp near Towner lake, Albany county, *W. G. Solheim* 24, 13 Jul. 1940 (FC). COLORADO: in Lily lake near Estes Park, Larimer county, *W. Kiener* 13175, 22 Sept. 1942 (FC, KI); Hoosier Pass, Park county, *Kiener* 6705a, 1 Sept. 1938 (FC, KI). UTAH: dripping cliffs, Mount Timpanogos, Utah county, *A. O. Garrett* 46, 25 Jul. 1925 (FC, UC). ARIZONA: on rocks in spray from Havasu falls, Coconino county, *E. U. Clover*, 28 Sept. 1940 (FC, MICH). ALASKA: Pt. Barrow (FH); lakes, Mileposts 70 and 127 (from Anchorage), Glenallen highway, *D. K. Hilliard* 34, 57, Sept. 1953 (FC); Mileposts 220 and 248 (from Anchorage), Richardson highway, *Hilliard* 24, 26, 6 Sept. 1953 (FC). WASHINGTON: Friday Harbor, *J. H. Hoskins*, Summer 1921 (DA, FC). OREGON: in aquarium, Lewis and Clark College, Portland, *S. E. Flint* 3, 21 Nov. 1947 (FC). CALIFORNIA: *W. J. V. Osterhout* 1777, 7 Jul. 1906 (FC, UC). Alameda county: on dripping boards, Lake Chabot, San Leandro, *Osterhout & N. L. Gardner*, 14 Jun. 1902 (as *Gloeotheca cystifera* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1204, FC, L, TA); spring on hillside, Arroyo Mocho, Mt. Hamilton range, *Gardner & A. Carter* 8006, 22 Nov. 1936 (FC, UC); cultures in the botanical laboratory, University of California, Berkeley, *Gardner* 1462 (UC), 2251 (UC), 6572, 6726, 6953, 7143, 7197, 7390, 7808, 1905—1933 (FC, UC); on soil and in rice culture, Agricultural greenhouse, University of California, Berkeley, *Gardner* 7194, 7209, Mar. 1933 (FC, UC); on flowerpots in the greenhouse, Department of Botany, University of California, Berkeley, *Gardner* 7171, 7566a, 15 Jan., 3 Sept. 1933 (FC, UC); in a flowerpot and cultivated in a hothouse in the courtyard of the Life Sciences Building, Berkeley, *Gardner* 6951, 7023, Jan. 1932 (FC, UC). Contra Costa county: culture from shaded ditch by mud-bath house, Byron Hot Springs, *Gardner* 7715, 11 Apr. 1933 (FC, UC). Humboldt county: culture from Eureka collected by H. E. Parks, *Gardner* 6728a, 7152, 17 Jan. 1932, 8 Jan. 1933 (FC, UC). Inyo county: Nevares spring near Cow creek, Death Valley, *G. J. Hollenberg* 2279, 7 Apr. 1937 (D). Los Angeles county: Pasadena, *A. J. McClatchie* 1090 (UC); Puddingstone creek and dam, La Verne, *Hollenberg* 1614a, 19 Dec. 1933 (FC, UC), *M. Kneeland* 1664, 9 Dec. 1936 (FC, UC); culture, University of Southern California, Los Angeles, *G. R. Johnstone*, 27 Jan. 1940 (FC); on wet concrete, dam in San Dimas canyon near La Verne, *Hollenberg* 2077A, 20 Apr. 1934 (D, NY). Marin county: *V. Duran* 6670, 6946, Jan. 1931, 1932 (FC, UC); culture from Almonte and Alto collected by H. E. Parks, *Gardner* 6566, 6570, 13 Jan. 1931 (FC, UC); on moist soil, Lake Lagunitas, *Osterhout*, Jul. 1906 (as *Aphanothece microscopica* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1702c, FC, L, TA), *W. A. Seitchell & Osterhout*, 23 Sept. 1908 (UC), *Seitchell* 6429a, 1908 (FC, UC); on dripping rocks, Mill Valley works, *Gardner*, 20 Jul. 1906 (as *Gloeotheca rupestris* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1703b, FC, MICH, TA), *Gardner* 1791 (TA, UC); Mill Valley, *Gardner* 4185, Mar. 1918 (UC), *Osterhout*, Nov. 1906 (UC); on dripping rocks, Mt. Tamalpais, *Osterhout & H. D. Densmore*, 4 Jul. 1906 (as *G. rupestris* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1703a, FC, L, MICH, TA), *Gardner* 1775, 4 Jul. 1906 (FC, UC), *Gardner* 3113, May 1916 (UC). Riverside county: dripping rocks, Palm Canyon, *Hollenberg* 1632, 29 Mar. 1935 (FC, UC). San Bernardino county: Arrowhead Hot Springs, *Seitchell* 1539, 1545, 19 Dec. 1896 (FC, UC), *Gardner* 17, 18, 27 May 1930 (FC, UC). San Diego county: along a stream west of Dulzura, *F. Drouet & J. F. Macbride* 4827, 18 Oct. 1941 (FC). San Francisco: Fort Point, *Gardner* 1778 (UC), on rocks, *Gardner* (as *Gloeocapsa polydermatica* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1751b, FC, L, TA); on moist sand, Mountain lake, *Gardner* 1462, 17 May 1905 (UC; as *Aphanothece microscopica* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1702a, FC, L, TA); in the conservatory, Golden Gate park, *Gardner* 7263, 7592, 3 May, 19 Sept. 1933 (FC, UC); in Plath's greenhouse, *Duran* 6957, 8 Jan. 1932 (FC, UC), *Gardner* 7246, 20 Apr. 1933 (FC, UC); floating in Lake Merced, *Gardner* 1583a, 13 Nov. 1905 (UC; as *A. microscopica* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1702b, FC, L, TA); on a bank of soft sandstone, Lake Merced, *Gardner* 844, Nov. 1902 (UC; as *Gloeotheca rupestris* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1703c, FC, L, MICH, TA); culture from Lake Merced, *Gardner* 7427, 24 Jul. 1933 (FC, UC). Santa Clara county: culture from Milpitas collected by H. E. Parks, *Gardner* 6659, 1931 (UC). Tulare county: on damp soil, Exeter, *H. E. Parks*, Dec. 1930 (UC); in shallow water of Tule river, Porterville, *Drouet & M. J. Groesbeck* 4448, 4450, 4 Oct. 1941 (FC).

PUERTO RICO: on rocks, Arroyo de los Corchos, Adjuntas to Jayuya, N. Wille 1697, 1703, Mar. 1915 (NY); on limestone, Arecibo to Utuado, Wille 1469b, 1470, Mar. 1915 (NY); Cabo Rojo, A. A. Heller 4435, Jan. 1890 (FC); rocks 7 km. east of Coamo, Wille 1873, Mar. 1915 (NY); Coamo Springs, Wille 372, II, Jan. 1915 (NY), 1861a, Mar. 1915 (FC, UC); on stones near Maricao, Wille 1129, Feb. 1915 (NY); on a water pipe near a stream, Maricao, Wille 1147 (Type of *Aphanobece conferta* var. *brevis* Gardn., NY [Fig. 160]; isotype, D), 1147a, Feb. 1915 (NY, D); on brick wall, Experiment Station, Mayaguez, Wille 967, Feb. 1915 (NY); Hacienda Catalina near Palmer, Wille 754a, Feb. 1915 (Type of *Aphanocapsa Richieriana* var. *major* Gardn., NY); on rocks near Penuelas, Wille 1848a, Mar. 1915 (Type of *Aphanobece microscopica* var. *granulosa* Gardn., NY [Fig. 151]); on wall of Fort Cristobal, San Juan, Wille 2003c (NY), A. Lutz 2018 (FC, UC), Mar. 1915; on wall of a cemetery, San Juan, Wille 131a, Dec. 1914 (Type of *Gloeocapsa quaternata* var. *major* Gardn., NY [Fig. 146]); on a wall by Hotel Nava, Santurce, Wille 54a, Dec. 1914 (Type of *Gloeobece interspersa* Gardn., NY [Fig. 155]); on tree trunk on hills near Santurce, Heller 4333, Jan. 1890 (FC); on limestone at the hacienda, Laguna Tortuguero, Wille 866a, Feb. 1915 (NY); on limestone, Utuado to Adjuntas, Wille 1640a, Mar. 1915 (Type of *Anacystis cylindracea* Gardn., NY [Fig. 156]); on rocks between Utuado and Adjuntas, Wille 1635a (D, NY), 1637a (FH, NY), 1650a,b (NY), Mar. 1915; on rocks about 10 km. north of Utuado, Wille 1525 (FC, UC), 1528a, 1566, 1568 (NY), Mar. 1915. JAMAICA: Middle Morant cay, V. J. Chapman 11, 14, 1939 (FC); on concrete wall, Arntully, C. R. Orcutt, 19 May 1928 (FC, US). MEXICO: Eisenbahnsumpfe bei Vera Cruz, F. Müller 167, Feb. 1853 (Type of *Palmella heterococca* Kütz., L [Fig. 153]); paredes húmedas, Cueva de Sambula, Morul, Yucatan, Exp. Rec. Hid. 97-143, 18 Mar. 1947 (FC); island in Rio Santa Catarina near Santa Catarina, Nuevo Leon, F. A. Barkley 146-09, 16 Aug. 1944 (FC, TEX); in crevices of rocks at Aurora, south of Baviácora, Sonora, F. Drouet, D. Richards, & W. A. Lockhart 2949, 16 Nov. 1939 (FC); in seepage near highway between Morelia and Ciudad México, F. B. Plummer, 5 Sept. 1943 (FC, TEX); on sides of cave and on bank of Rio Tuxpan, San José de Purúa, Michoacan, R. Patrick 431, 443, 4 Aug. 1947 (FC, PH); Lake Patzcuaro, Michoacan, Patrick 510, 517, 10 Aug. 1947 (FC, PH).

GUATEMALA: on limestone bluff, Cerro de Agua Tortuga near Cubilguitz, dept. Alta Verapaz, J. A. Steyermark 44588, 4 Mar. 1942 (FC); damp bank north of Chiantla, dept. Huehuetenango, P. C. Standley 82585, 6 Jan. 1941 (FC); on wet banks along stream, Jalapa, Steyermark 32149, 28 Nov. 1939 (FC); in cold trickle by road between San Francisco El Alto and Momostenango, dept. Totonicapán, Standley 83987, 19 Jan. 1941 (FC); on mud near the electric plant of Rio Hondo, base of Sierra de las Minas, dept. Zacapa, Standley 74057, 11 Oct. 1940 (FC). HONDURAS: in shallow running water near Yuscarán, dept. El Paraíso, Standley 1218, 11 Dec. 1946 (FC); on wet masonry and banks, El Zamorano, dept. Morazán, Standley 4413, 4416, 4422, 4423a, 4426, Feb. Mar. 1947 (FC). NICARAGUA: on wet bark, Chichigalpa, dept. Chinandega, Standley 11461, Jul. 1947 (FC); on tree trunk, La Libertad, dept. Chontales, Standley 8845, May-June 1947 (FC); on tree trunks, Casa Colorada near El Crucero, summit of Sierra de Managua, Standley 8191, 8213, May 1947 (FC). PANAMA: in north arm of Gigante bay, Canal Zone, C. W. Dodge, 9 Aug. 1925 (D, MO); in cave along San Carlos river, G. W. Prescott & R. L. Caylor CZ125, 10 Sept. 1939 (FC). BRAZIL: Pará: on moist wall of mill-race, Santa Izabel, east of Belém, F. Drouet 1534, 10 Jul. 1935 (D); on rocks in seepage from artificial spring, Bosque Rodriguez Alves, Belém, Drouet 1530, 1 Jul. 1935 (D). Ceará: in pools by road 3 km. south of Porangaba, Fortaleza, Drouet 1378, 23 Aug. 1935 (D, FH, MICH, NY); in a temporary reservoir in Rio Maranguapinho, Barro Vermelho, Fortaleza, Drouet 1499, 22 Nov. 1935 (D, FH, NY). ECUADOR: in rupibus humidis prope Baños (Tungurahua), G. Lagerheim, Dec. 1891 (S; as *Gloeobece tepidarium* in Witttr., Nordst., & Lagerh., Alg. Exs. No. 1545, L). PERU: agua alcalina, Chan-Chan y Buenos Aires, Trujillo, N. Ibañez H. "P", "W", 19 & 27 Oct. 1952 (FC). ARGENTINA: Cap. Federal, S. A. Guarrera 2201, 20 Sept. 1938 (FC); tapizando una pared. húmeda, Buenos Aires, Guarrera 3343, 25 Aug. 1939 (FC); culture in Instituto Bacteriológico, Dept. Nacional de Higiene, Buenos Aires, D. Rabinovich CP20, Dec. 1943 (FC). CHILE: in pool, Punta Arenas, R. Thaxter, 1905-1906 (D, FH).

HAWAIIAN ISLANDS: rocks on cliff, Nuuanu point, Honolulu, G. T. Shigeura, 4 Mar. 1939 (FC, PH); in a rice field, Aiea, Oahu, J. E. Tilden, 2 June 1900 (as *Aphanobece prasina* in Tild., Amer. Alg. no. 498, FC; as *Gloeobece fuscolutea* in Tild., Amer. Alg. no. 500, FC); in brackish stagnant water, Meheiwai, Makao, Koolauloa, Oahu, Tilden, 20 Jun. 1900 (as *Aphanobece prasina* in Tild., Amer. Alg. no. 498B, FC); on wet cliffs south of Laupahoehoe, Hawaii, Tilden, 10 Jul. 1900 (as *Gloeocapsa quaternata* in Tild., Amer. Alg. no. 499, FC). MARSHALL ISLANDS: on soil of open coconut grove, Taka islet, Taka atoll, F. R. Fosberg 33733, 5 Dec. 1951 (FC, US); on flat on south end of Bikar islet, Bikar atoll, Fosberg 34576, 6 Aug. 1952 (FC, US); ocean side of Enen-Edrik island, Arno atoll, L. Horwitz 9024, 7 Jul. 1951 (FC). SOCIETY ISLANDS: Tahiti, J. E. Tilden, Oct. 1909 (as *Aphanobece microspora* in Tild., So. Pacific Alg. no. 3, L, MIN, UC); on dripping rocks, Tahara mountain, Tahiti, W. A. Setchell & H. E. Parks 5067a, 24 May 1922 (UC); moist cliffs near mouth of Papenu river, Tahiti, Setchell & Parks 5351, 5 Jun. 1922 (UC).

SAMOA: on shaded tree-trunks, roadside beyond Aua, Tutuila island, *Setchell* 1178, 4 Jul. 1920 (UC); with *Hassallia Rechingeri* Wille, Upolu, K. H. *Rechinger* 5137, 1915 (Type of *Gloeotheca samoensis* f. *major* Wille in the slide collection of N. Wille, O.). GILBERT ISLANDS: surface of a Babai pit, center of North island, Onotoa, E. T. *Moul* 8324, 8 Aug. 1951 (FC); bottom of abandoned Babai pit, Tabuarorae island, Onotoa, *Moul* 8242, 26 Jul. 1951 (FC). NEW ZEALAND: Rangitoto island (Waitemata), V. J. *Chapman*, Jul. 1946 (FC); Orongo Bay (Bay of Islands), *Chapman*, Jan. 1948 (FC); Brown's island, Auckland harbor, *Chapman*, 18 Mar. 1950 (FC); in cave, fresh water, Kororareka Point (Bay of Islands), I. B. & V. R. *Warnock*, 16 Jan. 1935 (as *Coccochloris stagnina* in Tild., So. Pacific Pl., 2nd Ser., no. 358, FC).

PHILIPPINES: Bataan: on damp stone wall at Balanga, G. T. *Velasquez* 2404, 12 Jul. 1950 (FC, PUH); soil by the river, Panilao, Pilar, *Velasquez* 2412, 13 Jul. 1950 (FC, PUH). Batangas: floating in rice fields at Lipa, *Velasquez* 595a, 12 Jan. 1941 (FC). Iloilo: soil in ruined church, Dueñas, J. D. *Soriano* 1082, 20 Jul. 1952 (FC, PUH); in Delicana's fishpond, Dumangas, *Soriano* 1595, 1596, 25 Jan. 1953 (FC, PUH); on adobe wall of churchyard, Guimbal, *Soriano* 1570, 10 Jan. 1953 (FC, PUH); on aquarium, Iloilo College, Iloilo City, *Soriano* 1543, 10 Dec. 1952 (FC, PUH); in Griños fishponds, Leganes, *Soriano* 1591, 11 Jan. 1953 (FC, PUH); on damp walk at Catholic Church, Janiway, *Soriano* 1034, 23 Jun. 1952 (FC, PUH); on interior walls of ruined Catholic Church, Leon, *Soriano* 1820, 15 Feb. 1953 (FC, PUH); on sides of dam, Oganon river irrigation system, San Miguel, *Soriano* 1050, 29 Jun. 1952 (FC, PUH); on interior walls of ruined church, Santa Barbara, *Soriano* 1038, 23 Jun. 1952 (FC, PUH). Leyte: in pond in coral pit near airstrip, Tacloban, M. E. *Britton* 153, 10 Oct. 1945 (FC). Manila: *Soriano* 890, 5 May 1951 (FC, PUH); near Manila, R. C. *McGregor* 86, 23 Oct. 1904 (FC, UC); on sandy soil at Dewey boulevard, *Velasquez* 90, 12 Nov. 1939 (FC); on stone wall along Pennsylvania street, *Velasquez* 108a, 18 Nov. 1939 (FC); on walls and in an aquarium and a tank, *Velasquez* 468, 574, 591, 18 Mar., 26 Nov. 1940, 11 Jan. 1941 (FC); in concrete tank at Pennsylvania and California streets, Camina, *Soriano* 415, 16 Oct. 1949 (FC, PUH); in standing water in front of old Sto. Domingo church, Intramuros, *Soriano* 409, 11 Oct. 1949 (FC, PUH); on soil of garden, San Andres elementary school, Malate, *Soriano* 422, 17 Oct. 1949 (FC, PUH); on high wall of Malate church, *Soriano* 529, 3 Dec. 1949 (FC, PUH); on bark of acacia tree, 281 Cristobal street, Paco, *Soriano* 644, 26 Mar. 1950 (FC, PUH); in a rice field at Pandacan, *Velasquez* 572, 10 Aug. 1940 (FC); on adobe walls and soil and in standing water, Pandacan, *Soriano* 348, 350—352, 17 Aug. 1949 (FC, PUH); on wall under roof garden, Quiapo, *Soriano* 482, 22 Dec. 1949 (FC, PUH); on soil and adobe walls, Sampaloc, *Soriano* 70, 391, 393—695, 680, 751, 758, Jun. 1948—Nov. 1950 (FC, PUH); moist soil in school grounds, San Nicolas, *Soriano* 437, 21 Oct. 1949 (FC, PUH); in standing water, 2523 Herran street, Santa Ana, *Soriano* 445, 446, 24 Oct. 1940 (FC, PUH); on adobe fence, La Concordia College, Santa Ana, *Soriano* 551, 11 Dec. 1949 (FC, PUH); on inundated lot, Santa Cruz, *Soriano* 429, 19 Oct. 1949 (FC, PUH); in canal, Singalong, *Velasquez* 260, 3 Jan. 1940 (FC); in standing water and on an adobe fence, Singalong, *Soriano* 367, 588, 12 Sept., 26 Dec. 1949 (FC, PUH); on soil and walls, Tondo, *Soriano* 330, 517, 3 Aug., 27 Nov. 1949 (FC, PUH). Laguna: hot spring, Talakay, College, *Velasquez* 2464, 2465, 8 Aug. 1948 (FC, PUH). Mindoro: artesian well and pond, Tabinay Maliit, Puerto Galera, *Velasquez* 728, 729, 926, Apr. 1941 (FC); on a drying pond of brackish water at Balatero Malaki, Puerto Galera, *Velasquez* 944, 22 Apr. 1941 (FC); near the waterfall at Bisayaan, Puerto Galera, *Velasquez* 1954, 25 May 1949 (FC, PUH); Big Balatero, Puerto Galera, *Velasquez* 7, 25 Apr. 1953 (FC, PUH). Palawan: Cuyo, *Velasquez* 2848, 9 Jun. 1951 (FC, PUH); Araceli, *Velasquez* 2933, 15 Jun. 1951 (FC, PUH). Rizal: on drainage canal, University of the Philippines, Diliman, *Soriano* 236-3, 20 Jan. 1949 (FC, PUH); rice paddy near Km. 17, Marikina valley, *Soriano* 935, 18 May 1952 (FC, PUH); rice paddy, Barrio Mayanbayan, Marikina, *Soriano* 921, 16 May 1952 (FC, PUH); rice field at Barrio Mangahan, Pasig, *Soriano* 937, 18 May 1952 (FC, PUH); rice field, Broadway street, Quezon City, *Velasquez* 178, 13 Dec. 1939 (FC); moist ground, University of the Philippines campus, Diliman, Quezon City, *Velasquez* 2425, 2454, 22 & 28 Jul. 1950 (FC, PUH); in creek behind Christ the King Seminary, Kamuning, Quezon City, *Velasquez* 2538, 2540, 19 Aug. 1950 (FC, PUH); rice paddies along road to Taytay, Pasig, *Soriano* 930, 18 May 1952 (FC, PUH). Sulu Archipelago: on adobe, Sanga-Sanga, Tawi-Tawi, *Velasquez* 3218, 12 May 1952 (FC, PUH).

CHINA: Fukien: Fulung hot springs, H. H. *Chung* A439 (Type of *Aphanotheca gelatinosa* Gardn., FH; isotype, D), A454 (MICH, NY), Sept. 1926; Huangchun near Foochow, *Chung* A432, Sept. 1926 (D, FH). Kiangsu: on rock and in ditch, Nanking, C. C. *Wang* 317, 373, 16 & 20 Apr. 1930 (FC, UC). Szechwan: on wet rock, Lung-chi bridges, Nanzechwan, H. *Chu* 716, 7 Aug. 1945 (FC); on wet rock, Thousand Gods Cliff, Nanzechwan, H. *Chu* 774, 9 Aug. 1945 (FC); under dripping rock, Ko-Fu-Tung, Mt. King-Fu, Nan-chwan, *Chu* 849, 15 Apr. 1945 (FC); on rock in rapid stream, Shan-Shan-Kow, Omei, *Chu* 1329, 21 Aug. 1942 (FC); on rock under dripping cliff, Hu-Lung-Kiang, Omei, *Chu* 1336, 22 Aug. 1942 (FC); on dripping cliff, Elephant pond, Omei, *Chu* 1356, 23 Aug. 1942 (FC); on wet rock, Lung-Men-Tung, Omei, *Chu* 1389, 25 Aug. 1942 (FC). NEW GUINEA: open creek, H. J. *Rogers* NG23, 2 Oct. 1944

(FC). INDONESIA: Sumatra: an warmem Stein 10 cm. ober Wasser, am Boden des unteren Beckens, Bukit Kili, *Rutner*, 1928-29 (Type of *Aphanothece bullosa* var. *minor* Geidl., slide no. SKW1g in the collection of L. Geidler); Bukit Kili Ketgil, 5 cm. ober Wasser an Steinen, *Thienemann*, 7 Mar. 1939 (in slide collection of L. Geidler); Kalkstalaktiten, Grosser Wasserfall, Kalktuffe von Panjingahan am Westufer des Sees, *Rutner*, 6 Mar. 1929 (Type of *Gloeotheca rupestris* var. *major* Geidl., slide no. SkB3aß in the collection of L. Geidler). Flores: Bari, *A. Weber-van Bosse* 1192, Nov. 1888 (D, L). Celebes: Tempe, *Weber-van Bosse* 856, Oct. 1888 (L). AUSTRALIA: on dripping rocks, Paradise cave, Noosa, Queensland, *A. B. Cribb* 99, 24 May 1949 (FC); Point Lonsdale, Victoria, *A. Nash & T. T. Earle*, Nov. 1934 (as *Aphanothece stagnina* in Tild., So. Pac. Pl., 2nd Ser., no. 169, FC); Muston, American River inlet, Kangaroo island, South Australia, *H. B. S. Womersley* A6718b (K12305b), 10 Jan. 1948 (FC). BURMA: Pegu, Northern Yomah, Mayzelee Choung?, *S. Kurz* {1854, 20 Jan. 1868} (Type of *Gloeocapsa luteo-fusca* Mart. in herb. Agardh, LD; isotypes, K, L); Arracan, Kolodyne river, *S. Kurz* 1960 (L); Royal lake, Rangoon, *L. P. Khanna* 572, 2 Dec. 1935 (FC); Maymyo, Northern Shan States, *Khanna* 639, 12 May 1936 (FC); Monywa lake, Monywa, *Khanna* 857—859, 864, 867, 880, 883, 889—891, 15 Mar. 1938 (FC). INDIA: on paths in the Royal Botanic Garden, Calcutta, *S. Kurz* 7882, Jul. 1868 (L).

3. COCCOCHLORIS ELABENS Drouet & Daily, *Lloydia* 11: 77. 1948. *Micraloa elabens* Brébisson in Meneghini, Mem. R. Accad. Torino, 2nd ser., 5 (Sci. Fis. & Mat.): 104. 1843. *Microcystis elabens* Kützinger, Tab. Phyc. 1: 6. 1846. *Diplocystis elabens* Trevisan, Sagg. Monogr. Alg. Coccot., p. 40. 1848. *Polycystis elabens* Kützinger, Sp. Algar., p. 210. 1849. *Microhaloa elabens* Brébisson ex Ainé, Pl. Crypt.-Cellul. du Dept. Saone-et-Loire, p. 259. 1863. *Anacystis elabens* Setch. & Gardn. in Gardn., Univ. Calif. Publ. Bot. 6: 455. 1918. *Aphanothece elabens* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 146. 1938. —Type from Falaise, France (L). FIG. 168.

Palmella Castagnei Kützinger, Tab. Phyc. 1: 9. 1846. *Oncobyrsa Castagnei* Brébisson pro synon. in Kützinger, loc. cit. 1846. *Cagniardia Castagnei* Trevisan, Sagg. Monogr. Alg. Coccot., p. 51. 1848. *Aphanocapsa Castagnei* Rabenhorst, Fl. Eur. Algar. 2: 50. 1865. *Aphanothece Castagnei* Rabenhorst, Fl. Eur. Algar. 2: 64. 1865. *Coccochloris Castagnei* Drouet & Daily, *Lloydia* 11: 77. 1948. —Type from Aix, France (L).

Palmella pulchra Kützinger, Sp. Algar., p. 214. 1849. *Aphanocapsa pulchra* Rabenhorst, Fl. Eur. Algar. 2: 49. 1865. *Microcystis Grevillei* f. *pulchra* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 129. 1938. —Type from Hanau, Germany (L).

Protothoccus elongatus Nägeli in Kützinger, Sp. Algar., p. 197. 1849. *Synechococcus elongatus* Nägeli, Gatt. Einz. Alg., p. 56. 1849. —Type from Zürich, Switzerland (ZT).

Synechococcus violaceus Grunow in Rabenhorst, Fl. Eur. Algar. 3: 419. 1868. —Type from Wagram, Austria (W).

Polycystis Packardii Farlow in Packard, Amer. Nat. 13: 702. 1879. *Microcystis Packardii* Tilden, Minn. Alg. 1: 36. 1910. *Aphanothece Packardii* Setchell in Daniels, Amer. Nat. 51: 502. 1917. —Type from Great Salt lake, Utah (FH). FIG. 164.

Aphanothece utahensis Tilden, Amer. Alg. 3: 297. 1898. *A. salina* f. *utahensis* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 151. 1938. —Type from Great Salt lake, Utah (MIN). FIG. 169.

Synechococcus parvus Migula, Crypt. Germ., Austr. & Helvet. Exs. 26-27 (Alg.): 123. 1906. —Isotypes from Lainz near Vienna, Austria (MICH, NY, TA).

Synechococcus curvis Setchell in Collins, Holden & Setchell, Phyc. Bor.-Amer. 28: 1351. 1907. —Type from Oakland, California (UC). FIG. 167.

Microcystis elabens var. *minor* Nygaard, Vidensk. Medd. Dansk Naturh. Foren. Kjøbenh. 82: 204. 1926. —Type from Kai islands, Indonesia (in the collection of G. Nygaard).

Aphanothece microscopica var. *congesta* W. R. Taylor, Proc. Acad. Nat. Sci. Phila. 80: 85. 1928. —Type from Kootenay county, British Columbia (TA).

Aphanothece conglomerata Rich, Trans. Roy. Soc. S. Africa 20: 185. 1932. —Type from Cape Town, South Africa (D). FIG. 166.

Aphanothece Lebrunii DuVigneaud & Symoens, Inst. Parcs Nat. Congo Belge, Explor. Parc Nat. Albert, Mission J. Lebrun (1937—1938) 10: 9. 1948. —Type from Parc National Albert, Belgian Congo (BR). FIG. 165.

Aphanothece minor Frémy ex J. de Toni, Diagn. Alg. Nov. I. Myxophyc. 10: 959. 1955. —Type from Dutch West Indies (L).

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Aphanothece curvata Lagerheim, Öfvers. K. Sv. Vet.-Akad. Förh. 40(2): 44. 1888.

- Synechococcus Cedrorum* Sauvageau, Bull. Soc. Bot. France, ser. 2, 14: cxv. 1892.
- Aphanothece Stuhlmannii* Hieronymus in Engler, Pflanzenwelt Ostafri. C: 8. 1895. *A. Kuhlmannii* Hieronymus ex Geitler, Rabenh. Krypt.-Fl. 14: 171. 1932.
- Bacularia coerulescens* Borzi, Nuova Notarisia 1905: 21. 1905. *Aphanothece coerulescens* Geitler, Rabenh. Krypt.-Fl. 14: 173. 1932. *A. Geitleri* J. de Toni, Noter. Nomencl. Algal. 3. 1936.
- Aphanothece salina* Elenkin & Danilov, Bull. Jard. Imp. Bot. Pierre le Grand 15: 180. 1915.
- Gloeothece linearis* var. *composita* G. M. Smith, Bull. Wisconsin Geol. & Nat. Hist. Surv. 57: 46. 1920. *Rhabdoderma lineare* f. *compositum* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 44. 1938.
- Microcystis elabentoides* Zalessky, Rév. Gén. de Bot. 38: 33. 1926.
- Microcystis aphanothecoides* Zalessky, Rév. Gén. de Bot. 38: 33. 1926.
- Microcystis angulata* Zalessky, Rév. Gén. de Bot. 38: 34. 1926.
- Microcystis floccosa* Zalessky, Rév. Gén. de Bot. 38: 34. 1926.
- Microcystis globosa* Zalessky, Rév. Gén. de Bot. 38: 34. 1926.
- Aphanothece glebulenta* Zalessky, Rév. Gén. de Bot. 38: 34. 1926.
- Aphanothece cancellata* Zalessky, Rév. Gén. de Bot. 38: 35. 1926.
- Chroococcus kerguelensis* Wille, Deutsche Südpolar-Exped. 1901—03, 8: 414. 1928.
- Synechococcus elongatus* f. *minor* Wille, Deutsche Südpolar-Exped. 1901—03, 8: 417. 1928.
- Dzentsia salina* Woronichin, Bull. Jard. Bot. Princip. U. R. S. S. 28: 155. 1929.
- Aphanothece nostocopsis* Skuja, Acta Horti Bot. Univ. Latv. 7: 45. 1932.
- Aphanothece halophytica* Frémy in Hof & Frémy, Rec. Trav. Bot. Néerl. 30: 152. 1933.
- Aphanocapsa benaresensis* Bharadwaja, Proc. Indian Acad. Sci. 2: 96. 1935.
- Aphanothece karukerae* Lami, Rév. Algal. 11: 221. 1938.
- Synechococcus subsalsus* Skuja, Acta Horti Bot. Univ. Latv. 11—12: 44. 1939.
- Synechococcus Koidzumii* Yoneda, Acta Phytotax. & Geobot. 13: 97. 1943.

Plantae aeruginosae, olivaceae, luteolae, violaceae, vel roseae, microscopicae vel macroscopicae, 1—pluri—multi-cellulares, cellulis in divisione binis quadrato-sphaericis usque ad elliptico-cylindraceas, aetate provecta cylindraceis, ad apices truncato-rotundis, diametro 2—6 μ crassis, usque ad 8-plo longiores, rectis, in matrice gelatinosa saepe conferte completis; gelatino vaginale hyalino, homoganeo, nonnumquam omnino diffuente; protoplasmate aerugineo, olivaceo, luteolo, violaceo, vel roseo, homoganeo vel granuloso. FIGS. 164—169.

On wet rocks, wood, and soil, in seepage, in shallow fresh, brackish, and marine waters, and in the plankton. The smaller growth-forms of this species may sometimes be confused with those of *Anacystis montana*. Where the cells are large, they may be distinguished from cells of *Coccochloris stagnina* by their more cylindrical shape and their apparently truncate ends.

Specimens examined:

GERMANY: Grunewaldsee [bei Berlin], am Ufer, P. Hennings, Mai 1888 (as *Coccochloris piscinalis* in Henn., Phyk. March. no. 44, FH, L; in Hauck & Richt., Phyk. Univ. no. 240, L); Schlachtensee [bei Berlin], Hennings, Aug. 1892 (as *C. piscinalis* in Henn., Phyk. March. no. 44, FH, L); Leipzig, O. Bulnheim (FH); Polenz bei Wurzen, Bulnheim, 1859 (FH, NY); Torfmoor, Wurzen bei Leipzig, Bulnheim (B); Leipzig, Altmannsdorf, P. Richter (UC); Hanau, Theobald (Type of *Palmella pulchra* Kütz., L; isotype, UC). AUSTRIA: in fontis fundo prope Wagrain Austriae superioris, de Mörl, Aug. 1862 (Type of *Synechococcus violaceus* Grun., W); Tiergarten von Lainz unweit Wien, in Wassergefäßen weiter cultiviert, K. H. Reehinger, Oct. 1904 (isotypes of *S. parvus* Mig., Crypt. Germ., Austr., & Helv. Exs., Alg. no. 123, MICH, NY, TA). SWITZERLAND: Zürich, im Katzenssee, Überzug auf Schlamm am Ufer, C. von Nägeli, Jul. 1847 (Type of *S. elongatus* Näg. and *Protococcus elongatus* Näg. with *Leptothrix calcarea* Näg., ZT). FRANCE: Falaise, Calvados, A. de Brébisson (Type of *Micraloa elabens* Bréb., L [Fig. 168]; isotypes, B, FC, L, S; as *Polycystis elabens* in Rabenh. Alg. no. 2178, B, FH, L, S, UC; as *Microcystis elabens* in Desmaz., Pl. Crypt. Fr. no. 1952, FC), Brébisson 726 (L); Aix en Provence, ex herb. Lenormand, Castagne (Type of *Palmella Castagnei* Kütz., L; isotypes, FC, UC); dans l'étang salé de la Valdue près Aix, Castagne (L, S; as *Palmella Castagnei* in Desmaz., Pl. Crypt. Fr. no. 1955, FI). BELGIAN CONGO: Mayya-moto, rivière Mokondo, Parc National Albert, J. Lebrun 9209, Dec. 1937 (Type of *Aphanothece Lebrunii* Duvinç. & Sym., BR [Fig. 165]). UNION OF SOUTH AFRICA: Zeekoe Vlei, Cape Flats near Cape Town, Mrs. G. E. Hutchinson 35, 1928 (Type of *A. conglomerata* Rich, D[Fig. 166]). NEW BRUNSWICK: Island lake, 30—50 miles due south of Dalhousie, M. Le Mesurier 5,

Aug. 1953 (FC); edge of lake, Blue Bell, Victoria county, *H. Habeeb* 10349, 7 Jul. 1948 (FC, HA); in lake 8 miles south of Grand Falls, *Habeeb* 11650, 11655, 22 Jun. 1951 (FC, HA). MASSACHUSETTS: Horn pond, Woburn, *F. S. Collins* 5739, Sept. 1908 (FH). RHODE ISLAND: Watch Hill pond, Watch Hill, *W. A. Setchell* 6425, 16 Jun. 1908 (FC, UC). CONNECTICUT: in ditches in salt marsh, Eastern point, Groton, *Setchell*, 13 Jul. 1888 (UC). MARYLAND: in a marsh pool at Chance, Somerset county, *P. W. Wolle & F. Drouet* 2268, 22 Aug. 1938 (FC). NORTH CAROLINA: on overhanging rocks below Dry falls, Highlands, Macon county, *H. C. Bold* H220, 29 Jun. 1939 (DA, FC); intertidal sand in turtle pen, Fish & Wildlife Laboratory, Beaufort, *H. J. Humm*, 5 Aug. 1949 (FC); intertidal sand inside beach, Shackleford Banks, Beaufort, *Humm*, 7 Aug. 1949 (FC). SOUTH CAROLINA: Alligator lake near Myrtle Beach, Horry county, *P. J. Philson* SC1, 2 Jul. 1932 (FC). FLORIDA: intertidal on sand in St. Andrews bay at Hathaway bridge, west of Panama city, Bay county, *F. Drouet & C. S. Nielsen* 10928, 15 Jan. 1949 (FC, T); Eastpoint, shore on U. S. highway no. 98, Franklin county, *G. C. Madsen, A. L. Pates, M. N. Hood, & L. Elias* 1949, 11 Sept. 1949 (FC, T); on Chara, Hernando county, *M. A. Brannon* 557, 23 Oct. 1948 (FC, PC); on pilings in the pond at 14th and Center streets, Leesburg, Lake county, *Dror & Brannon* 11077, 19 Jan. 1949 (FC); saline pool, Southeast Hammock, Big Pine key, Monroe county, *E. P. Killip* 42479, 7 Jan. 1953 (FC, US); wet sand in the outlet of a sewer into Santa Rosa sound, Fort Walton, Okaloosa county, *Drouet, Nielsen, Madsen, D. Crowson, & Pates* 10645, 9 Jan. 1949 (FC, T); Buggs Springs, Okahumpka, Lake county, *J. Branham*, 10 Apr. 1955 (D, T).

MICHIGAN: pool along shore of Echo lake, Bois Blanc island, Mackinac county, *H. K. Pbinney* 34, 8 Jul. 1942 (FC, PHI); submerged near shore, Carp lake, Emmet county, *W. A. Daily* 43, 2 Jun. 1935 (DA, FC); Sodon lake, Oakland county, *S. A. Cain*, Dec. 1947 (FC). INDIANA: lake 2 miles north of Columbus, Bartholomew county, *W. A. & F. K. Daily & C. Kenoyer* 1162, 19 Sept. 1943 (DA, FC); Little Eagle lake, Winona Lake, Kosciusko county, *C. M. Palmer* B420, 23 Aug. 1935 (DA, FC); shore of Messick lake north of Eddy, Lagrange county, *F. K. & W. A. Daily* 2689, 26 Aug. 1953 (DA, FC); in Lost lake, Culver, Marshall county, *F. K. & W. A. Daily* 1510, 1516, 3 Jul. 1946 (DA, FC); in Lake Maxinkuckee, Culver, *F. K. & W. A. Daily* 1529, 4 Jul. 1946 (DA, FC); in Bass lake, 5 miles south of Knox, Starke county, *F. K. & W. A. Daily* 1562, 6 Jul. 1946 (DA, FC); Crooked lake, Steuben county, *Palmer* B49, Sept. 1933 (DA, FC). WISCONSIN: Wandewoga Lake, *G. W. Prescott* 3W57, 3W137, 8 Aug. 1938 (FC). MISSOURI: in a muriatic spring, Kimmswick, Jefferson county, *J. A. Steyermark*, 1 May 1934 (D). LOUISIANA: in ponds, Little Lake Club, Plaquemines parish, *J. N. Gowanloch*, Sept. 1944 (FC).

NEBRASKA: culture from gravel pit northwest of Fremont, Dodge county, *W. Kiener* 13769, 16 Jul. 1944 (FC, KI); plankton in pool, Lincoln, *Kiener* 16593, 16594, 15 May 1944 (FC, KI), and culture, *Kiener* 16351, 13 Jul. 1944 (FC, KI); culture from soil in red oak woods 3 miles south of Lincoln, *Kiener* 13741, 16 Jul. 1944 (FC, KI); culture from roadside ditch 4 miles east of Maxwell, Lincoln county, *Kiener* 16463c, 1 Oct. 1944 (FC, KI); culture from Dismal river near Halsey, Thomas county, *Kiener* 16750c, 7 Oct. 1945 (FC, KI). WYOMING: Yellowstone National Park: border and bottom of Bath lake, Lower Geyser Basin, *W. A. Setchell* 1932, 27 Aug. 1898 (FC, UC); in stream from the spring under the main road and boardwalk, Mammoth hot springs, *Setchell* 2021, 2022, 1 Sept. 1898 (FC, UC); spring on Angel Terrace, Mammoth hot springs, *Setchell* 2000, 31 Aug. 1898 (FC, UC); in Bath lake, Mammoth hot springs, *Setchell* 1995, 1997, 2004a, 31 Aug. 1898 (FC, UC); in overflow and in pool, Cleopatra Terrace, Mammoth hot springs, *Setchell* 1982, 1988, 31 Aug. 1898 (FC, UC); borders of small spring above Devil's Kitchen, Mammoth hot springs, *Setchell* 2002, 31 Aug. 1898 (FC, UC); overflow pool from Minerva Terrace, Mammoth hot springs, *Setchell* 2027, 1 Sept. 1898 (FC, UC); pool from a very small spring, Pulpit Terrace, Mammoth hot springs, *Setchell* 1999, 31 Aug. 1898 (FC, UC); in a side pool of the spring (Laundry pool) nearest West Thumb station, *Setchell* 1914, 23 Aug. 1898 (FC, UC). Medicine Bow National Forest: bottom of Trail's Divide lake, *W. G. Solheim* 14, 22 Jun. 1933 (FC). NEW MEXICO: in the outlet of a hot spring, Montezuma (Hot Springs), San Miguel county, *F. Drouet & D. Richards* 2671, 19 Oct. 1939 (FC).

UTAH: Great Salt Lake: *A. S. Packard Jr.* on Hayden's Expedition (Type of *Polycystis Packardii* Farl., FH [Fig. 164]; isotype, D); *Mrs. E. A. McVicker* (FC, UC); *J. A. Harris*, Jul. 1929 (MIN); *E. R. Walker*, 1908 (FC, UC); *D. Stuard*, 17 Sept. 1928 (FC); Sta. Ac, *A. J. Eardley* 3, 4, 1934 (D); Black Rock, Salt Lake county, *A. O. Garrett* 23, 27, 27 Aug. 1929 (FC, UC); *R. P. Ehrhardt* 1, 3, 21 Oct. 1946 (FC); East bay, *Garrett* 17, 15 Jun. 1929 (FC, UC); Saltair, Salt Lake county, *Garrett* 24, 27 Aug. 1929 (FC, UC), *Drouet & H. B. Louderback* 5734, 5763, 5766, 21 Aug. 1946 (FC); West Point, *Garrett* 11—14, 22 Jun. 1929 (FC, UC); Garfield Beach, *J. E. Tilden*, 7 Jul. 1897 (Type of *Aphanothece utahensis* Tild. in Tild., Amer. Alg. no. 297, MIN; isotypes, FC [Fig. 169], L, UC; as *Polycystis Packardii* in Tild., Amer. Alg. no. 298, B, FC, L); near Stansbury island, *Garrett* 3, Aug. 1929 (FC, TA, UC). ARIZONA: south slope of Calville wash, Lake Mead, *E. U. Clover*, 12 Sept. 1940 (FC, MICH). NEVADA: sloughs near Fairbanks Springs house, Ash Meadows, Nye county, *I. La Rivers* 1010, 3 Apr. 1950 (FC); in hot water

just above level of Pyramid lake, west side of Pyramid, Washoe county, *La Rivers* 1405, 22 Sept. 1951 (FC). ALASKA: small pond, Milepost 42 (from Anchorage), Steese highway, *D. K. Hilliard* 2, 3 Sept. 1953 (FC); Mile 163 (from Anchorage), Glenallen highway, *Hilliard* 17a, 13 Sept. 1953 (FC). BRITISH COLUMBIA: Spillamacheen valley lakes near Bald mountain, Purcell range, Kootenay county, *W. R. Taylor*, Sept. 1925 (Type of *Aphanothece microscopica* var. *congesta* *W. R. Taylor*, TA). CALIFORNIA: culture from an aerating tank, West Berkeley, *N. L. Gardner* 6926, 21 Oct. 1930 (FC, UC); in a cold pool, Bridgeport, Mono county, *M. J. Groesbeck* 42, 5 Apr. 1940 (FC); small hot spring at Hot Creek, about 2 miles south of Whitmore Tubs, Mono county, *Groesbeck* 61, 16 Jun. 1940 (FC); in hot salt water near Key Route power house, Oakland, *Gardner* 1557, 6 Sept. 1905 (Type of *Synechococcus curvis* *Setch.*, UC; isotypes, FC, and in Coll., *Hold.*, & *Setch.*, Phyc. Bor.-Amer. no. 1351, FC [Fig. 167], L, TA), *Gardner* 1508, Jul. 1905 (FC, UC); culture (from Woods Hole, Massachusetts, from *E. H. Battley*) in Hopkins Marine Station, Pacific Grove, *M. B. Allen*, 29 Jan. 1952 (FC).

BAHAMA ISLANDS: Nassau, *A. E. Wight*, Jan. 1905 (FH); Lake Cunningham, New Providence, *A. D. Peggs*, Jul. 1940, 1941, 10 May 1941 (FC). BRITISH WEST INDIES: in canals of salt works, Cockburn Harbor, South Caicos, *M. A. Howe* 5581, 16 Dec. 1907 (D, FH, L). PUERTO RICO: pools, College of Agriculture, Mayaguez, *L. R. Almodóvar* 375, 412, 22 Aug. 1954 (D, T).

JAMAICA: in a brackish pond, north cay, Morant cays, *V. J. Chapman* 9a, 1939 (FC); in the brackish pond, Gun cay, Kingston, *Chapman* 3d, 1939 (FC). DUTCH WEST INDIES: Bonaire: ten zuiden van Witte Pan, Pekelmeer, *P. Wagenaar Hummelinck*, Sept. 1930 (L); Salinja Tam, *Wagenaar Hummelinck*, Nov. 1930 (L); Salinja de Klein Bonaire, *Wagenaar Hummelinck*, Sept. 1930 (Type of *Aphanothece minor* *Frémy*, L). BRAZIL: in a freshwater pond in the dunes, Arpoadourous, Fortaleza, Ceará, *F. Drouet* 1469, 5 Oct. 1935 (D); praia da Sununga, Ubatuba, São Paulo, *A. B. Joly* 9, 3 July 1953 (D); rain pool on concrete dam of tanque, Anil, São Luiz, Maranhão, *Drouet* 1325, 24 Jul. 1935 (D). ECUADOR: salt lake south of Tagus cove, Albemarle island, Galapagos islands, *W. L. Schmitt* 331—35, 10 Dec. 1934 (FC). PERU: near Lima, *A. Maldonado* 1, Dec. 1940 (FC); salt lakes, Haucho, prov. Chancay, *Maldonado* 88, 94, 95, Feb., Mar. 1942 (FC). ARGENTINA: culture in Instituto Bacteriologico, Depto. Nacional de Higiene, Buenos Aires, *D. Rabinovich* CP11, Dec. 1943 (FC). GILBERT ISLANDS: fish-pond in south part of Beru, *Mrs. R. Catala* 23, Jul. 1951 (FC). WEST AUSTRALIA: Pink lake, Rottnest island, near Perth, *L. A. Doore*, 12 Oct. 1934 (in *Tild.*, So. Pacific Pl., 2nd Ser., no. 18, FC). CHINA: plankton of West lake, Hangchow, *Chekiang*, *J. E. Nielsen*, 29 Sept. 1923 (FC). INDONESIA: plankton of Lake Ohoitiel, Kai islands, *H. Jensen & O. Hagerup*, 1922 (Type of *Microcystis elabens* var. *minor* *Nyg.*, in the slide collection of *G. Nygaard*); Siteo Bagendit, West Java, *A. Weber-van Bosse* 755, 1888 (D, FH, L).

4. COCCOCHLORIS PENIOCYSTIS *Drouet & Daily*, *Lloydia* 11: 78. 1948. *Gloeocapsa Peniocyctis* *Kützing*, *Tab. Phyc.* 1: 25. 1846. *Peniocyctis purpurea* *Brébisson pro synonym.* in *Kützing*, loc. cit. 1846. *Gloeothece linearis* var. *purpurea* *Brébisson* in *Rabenhorst*, *Alg. Eur.* 218—220: 2193. 1870. *Bichatia Peniocyctis* *Kuntze*, *Rev. Gen. Pl.* 2: 886. 1891. *Anacystis Peniocyctis* *Dr. & Daily*, *Amer. Midl. Nat.* 27: 651. 1942. —Type from Arramanches, France (L). *Wille* in *Nyt Mag. Naturvid.* 62: 196 (1925) erroneously interpreted *Kützing's* original description as referring to *Anacystis thermalis*, plants of which are present in the original specimens.

Gloeocapsa purpurea *Kützing*, *Tab. Phyc.* 1: 18. 1846. *Bichatia purpurea* *Kuntze*, *Rev. Gen. Pl.* 2: 886. 1891. —Type from Arramanches, France (L). *Wille* in *Nyt Mag. Naturvid.* 62: 196 (1925) erroneously interpreted *Kützing's* original description as referring to *Anacystis thermalis*, plants of which are present in the original specimens.

Cryptococcus carneus *Kützing*, *Sp. Algar.*, p. 146. 1849. —Type from St. Chamas, Bouches du Rhone, France (L).

Gloeothece linearis *Nägeli*, *Gatt. Einzell. Alg.*, p. 58. 1849. —Type from Blickensdorf, Zug, Switzerland (ZT).

Aphanothece saxicola *Nägeli*, *Gatt. Einzell. Alg.*, p. 59. 1849. *Palmogloea saxicola* *Nägeli pro synonym.*, loc. cit. 1849. —Type from Küsnacht, Zürich, Switzerland (ZT).

Aphanothece saxicola var. *aquatica* *Wittrock* in *Wittrock & Nordstedt*, *Alg. Exs.* 6: 295. 1879. —Type from Upsala, Sweden (S). FIG. 170.

Aphanothece caldariorum var. *cavernarum* *Hansgirg*, *Bot. Centralbl.* 37: 38. 1889. —Type from Korno near Beroun, Bohemia (W).

Aphanothece subachroa *Hansgirg*, *Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl.*, 1890(2):

98. 1891. *A. saxicola* f. *subachroa* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 151. 1938.
—Type from Smichov, Bohemia (W). FIG. 172.
Gloeotheca lunata W. & G. S. West, Journ. Linn. Soc. Bot. 30: 277. 1894. —Type from St. Vincent, West Indies (BM).
Synechococcus minutus West, Proc. Roy. Irish Acad. 31: 40. 1912. —Type from Clare island, Ireland (BIRM).
Synechocystis primigenia Gardner, Mem. New York Bot. Gard. 7: 2. 1927. —Type from Arecibo, Puerto Rico (NY).
Aphanothece bacilloidea Gardner, Mem. New York Bot. Gard. 7: 5. 1927. —Type from near Arecibo, Puerto Rico (NY).
Gloeocapsa cartilaginea var. *minor* Gardner, Mem. New York Bot. Gard. 7: 9. 1927. —Type from Arecibo, Puerto Rico (NY).
Gloeotheca prototypa Gardner, Mem. New York Bot. Gard. 7: 14. 1927. —Type from Arecibo, Puerto Rico (NY). FIG. 171.
- Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:
- Cylindrocystis coerulescens* Brébisson in Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 91. 1843. *Pleurococcus coerulescens* Brébisson in Rabenhorst, Fl. Eur. Algar. 3: 28. 1868. *Chroococcus coerulescens* Forti, Syll. Myxophyc., p. 25. 1907.
Synechococcus racemosus Wolle, Bull. Torr. Bot. Club 8: 37. 1881.
Bacillus muralis Tomaschek, Bot. Zeitung 45: 665. 1887. *Aphanothece caldarium* b. *muralis* Hansgirg, Prodr. Algenfl. Böhmen 2: 137. 1892. *A. caldarium* var. *muralis* Hansgirg ex Forti, Syll. Myxophyc., p. 80. 1907. *A. muralis* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 69. 1907.
Aphanothece saxicola var. *violacea* W. & G. S. West, Trans. Roy. Microsc. Soc. 1894: 17. 1894.
Rhabdoderma lineare Schmidle & Lauterborn, Ber. Deutsch. Bot. Ges. 18: 148. 1900.
Microcystis orissica West, Journ. & Proc. Asiatic Soc. Bengal, N. S. 7: 84. 1911.
Rhabdoderma Gorskii Woloszynskia, Bull. Acad. Sci. Cracovie, Cl. Math. & Nat., ser. B, 1917: 127. 1917.
Rhabdogloeae ellipsoidea Schröder, Ber. Deutsch. Bot. Ges. 35: 549. 1917. *Dactylococcopsis ellipsoidea* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, lb. 44. 1942.
Aphanothece longior Naumann, K. Sv. Vet.-Akad. Handl. 62(4): 17. 1921. *A. saxicola* f. *longior* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 149, 151. 1938.
Spirillopsis irregularis Naumann, K. Sv. Vet.-Akad. Handl. 62(4): 18. 1921. *Rhabdoderma irregulare* Geitler in Pascher, Süßwasserfl. 12: 113. 1925.
Aphanothece clathrata var. *brevis* Bachmann, Verh. Naturf. Ges. Basel 35(1): 152, 165. 1923.
Rhabdoderma sigmoideum Moore & Carter, Ann. Missouri Bot. Gard. 10: 398. 1923.
Rhabdoderma sigmoideum f. *minus* Moore & Carter, Ann. Missouri Bot. Gard. 10: 398. 1923.
Dactylococcopsis Smithii R. & F. Chodat, Veröffent. Geobot. Inst. Rübel Zürich 3: 455. 1925.
Dactylococcopsis Smithii var. *sigmoidea* R. & F. Chodat, Veröffent. Geobot. Inst. Rübel Zürich 3: 445. 1925.
Aphanothece saxicola var. *clathratoides* Liebetanz, Bull. Int. Acad. Polon. Sci., Cl. Sci. Math. & Nat., ser. B, 1925: 109. 1925.
Aphanothece rubra Liebetanz, Bull. Int. Acad. Polon. Sci., Cl. Sci. Math. & Nat., ser. B, 1925: 109. 1925.
Dactylococcopsis Elenkenii Roll, Ann. de Protistol. 1: 164. 1928.
Gloeotheca coerules Geitler, Arch. f. Protistenk. 60: 440. 1928.
Cyanocloster muscicola Kufferath, Ann. Crypt. Exot. 2: 49. 1929.
Krkia croatica Pevalek, Acta Bot. Inst. Bot. Univ. Zagreb. 4: 55. 1929.
Rhabdoderma Gorskii var. *spirale* Lundberg, Bot. Notiser 1931: 279. 1931.
Tetracus Ilsteri Skuja, Acta Horti Bot. Univ. Latv. 7: 46. 1932.
Gloeotheca Kriegeri Frémy, Ann. Crypt. Exot. 5: 193. 1932.
Dactylococcopsis alaskana Kol, Smiths. Misc. Coll. 101(16): 27. 1942.
Dactylococcopsis planctonica Teiling, Bot. Notiser 1942: 64. 1942.
Dactylococcopsis scenedesmoides Nygaard, K. Danske Videnskab. Selsk. Biol. Skr. 7(1): 185. 1949.
Dactylococcopsis rhabdidioides var. *solitaria* Fjerdingstad, Dansk Bot. Ark. 14(3): 33. 1950.
Rhabdoderma vermiculare Fott, Preslia 24: 192. 1952.

Plantae violaceae, roseae, vel aerugineae, microscopicae vel macroscopicae, 1—pluri—multi-cellulares, cellulis in divisione binis cylindraceis, aetate provecta longi-

cylindræcis et ad apices rotundis, haud raro attenuato-conicis, diametro 1—3 μ crassis, usque ad 12-plo longiores, curvatis vel rectis; gelatino vaginale hyalino, homogæneo vel lamelloso, saepe omnino diffuente; protoplasmate violaceo, roseo, vel aerugineo, homogæneo, nonnumquam granuloso. FIGS. 170—172.

On wet rocks, wood, and soil, in seepage, in shallow and deep fresh water, and in the plankton. In the plankton there is sometimes encountered a growth-form with cells somewhat attenuated and bluntly conical at the tips. The large bacteria are often confused with this species, as are likewise certain smaller growth-forms of *Anacystis montana* and *Palmogloea protuberans* (Sm. & Sow.) Kütz., especially where the latter are poorly preserved. In hot springs the one- and two-celled hormogonia of *Phormidium laminosum* (Ag.) Gom., *P. tenue* (Menegh.) Gom., and *P. Treleasei* Gom. are reminiscent, in some respects, of the cells of *Coccochloris Peniocyctis*. The short hormogonia of *Plectonema Nostocorum* Born. and of the organism passing under the name *Phormidium mucicola* Naum. & Hub. can also be mistaken as cells of this species.

Specimens examined:

SWEDEN: in piscina in Lassby backar prope Upsaliam, V. Wittrock, 20 Oct. 1878 (Type of *Aphanothece saxicola* var. *aquatica* Witttr. in Witttr. & Nordst., Alg. Exs. no. 295, S; isotypes, FC [Fig. 170], L); Kristineberg, Bohuslän, G. Lagerheim, 13 Jul. 1884 (D, S); in piscina ad Strömsberg in Smolandia, O. Nordstedt, Jul. 1890 (as *Coccochloris Trentepohlii* in Witttr., Nordst., & Lagerh., Alg. Exs. no. 1598, L, N); in spelunca Silfvergrotten montis Kullen Scaniae, H. G. Simmons, Jul. 1897 (S); Möja, Upland, O. Borge, Sept. 1932 (S). ROMANIA: ex palude Saltica, dist. Ilfov, E. C. Teodorescu 1041, 13 Nov. 1901 (FC, W). GERMANY: Dresden, hort. bot., Lagerheim, 6 Oct. 1882 (FC, D, L, S). CZECHOSLOVAKIA: Bohemia: in der Kalksteinhöhle unter dem Katarakt im Felsenthale unterhalb Korno nächst Beraun, A. Hansgirg, Sept. 1888 (Type of *Aphanothece caldarium* var. *cavernarum* Hansg., W; isotype, FC); auf feuchten Hölzern in Warmhäusern in k. k. botanischen Garten am Smichow, Hansgirg, Dec. 1883 (Type of *Aphanothece subachroa* Hansg., W; isotype, FC); in caldariis horti in Tetschen, Hansgirg, Aug. 1890 (FC, W). AUSTRIA: Wien, Hort. bot., Lagerheim, 4 Oct. 1882 (D, S); ad parietes caldarium horti Augarten Vindobonae, Hansgirg, 30 Dec. 1884 (as *A. caldarium* in Witttr. & Nordst., Alg. Exs. no. 793, FC, L, NY, S; and in Kerner, Fl. Exs. Austro-Hung. no. 1998, L, MO, S); Vindobonae in tepidariis horti botanici universitatis, K. Rehbinger, Apr. (as *Gloeotheca tepidarium* in Mus. Vindob. Krypt. Exs. no. 2138, FC, L). JUGOSLAVIA: Pola, Istria, A. Hansgirg, Apr. 1889 (FC, W). SWITZERLAND: Ct. Zug, Blickensdorf, an schattigen Felsen, K. von Nägeli (Type of *Gloeotheca linearis* Näg., ZT); ad saxa, Zürich, G. Winter, Jul. 1878 (L); Ct. Zürich, Küsnacht, an feuchten Felsen, Nägeli 300, Sept. 1847 (Type of *Aphanothece saxicola* Näg., ZT). NETHERLANDS: Kortenhoefse plashen, A. Weber-van Bosse 144, Jun. 1886 (FC, L); warme kas, Utrecht, R. A. Maas Geesteranus, Oct. 1942 (L); on artificial rocks, hortus botanicus, Leiden, A. Meeuse & J. van Ooststroom 7658, Oct. 1942 (L), J. T. Koster 1032, 16 Oct. 1946 (FC, L), P. Leenbouts, 14 Oct. 1948, 12 Oct. 1950 (FC, L).

BRITISH ISLES: with Sphagnum, Mulranny, Clare island, Ireland, W. West, 7 Jun. 1911 (Type of *Synechococcus minutus* West, BIRM). FRANCE: Bouches du Rhone: St. Chamas, ex herb. Lenormand (Type of *Cryptococcus carneus* Kütz., L). Calvados: Arromanches, A. de Brébisson (Type of *Gloeocapsa Peniocyctis* Kütz. and *G. purpurea* Kütz., L; isotypes, FC, NY, UC); dans une cascade des falaises d'Arromanches, Brébisson (as *G. purpurea* in Rabenh. Alg. no. 1596, FC, MIN, L), Sept. 1845 (L); sur des rochers calcaires arrosés par une source limpide, Brébisson (as *Gloeotheca linearis* var. *purpurea* in Rabenh. Alg. no. 2193, L, MIN, S; in Roumeguère, Alg. de Fr. no. 519, L); rochers inondés d'une rivière, Falaise, Brébisson (L); Falaise, herb. A. Le Jolis, Aug. 1844 (NY); Falaise, herb. Lenormand (S); anciennes carrières d'Allemagne aux environs de Caen, P. Prémly 739, Apr. 1924 (NY); Bayeux, Brébisson (L, S); Caen, etc. (as *Palmella hyalina* in Chauvin, Alg. de Normand. no. 130, L). Cher: Bourges, O. Ripart 265, Apr. 1877 (S). Seine et Marne: environs de Melun, Roussel (as *Gloeocapsa Peniocyctis* in Roumeguère, Alg. de Fr. no. 26, L). MASSACHUSETTS: quarry, West Quincy, F. C. Seymour, 25 Sept. 1938 (FC). RHODE ISLAND: Hope reservoir, Providence, Appleton, Dec. 1883 (FH). NEW YORK: Glen lake, Warren county, W. R. Maxon (NY). WEST VIRGINIA: on sandstone in a spring, Buckhannon river 5 miles below Buckhannon, Upshur county, H. K. Phinney 529, 30 Aug. 1938 (FC, PHI). NORTH CAROLINA: on wet rock near stream, rear of Duke University stadium, Durham, F. Jones 3, Apr. 1947 (FC). FLORIDA: on wet limestone about the entrance to the cave, Florida Caverns state park, Jackson county, F. Drouet, C. S. Nielsen, G. C. Madsen, & D. Crowson 10384, 4 Jan. 1949 (FC, T).

OHIO: on cement wall, Peterson's greenhouse, Cincinnati, W. A. Daily & A. H. Bickler 286, 305, 23 Apr. 1940 (DA, FC), Daily 440, 441, 846, 9 Jul. 1940, 11 Jan. 1941 (DA, FC). KEN-

TUCKY: on wet sandstone, Torrent, Wolfe county, W. A. & F. K. Daily & R. Kosanke 465, 466, 14 Jul. 1940 (DA, FC); on wet sandstone, Tight Holler, Pine Ridge, Wolfe county, W. A. Daily, A. T. Cross, & J. Tucker 766, 810, Sept. 1940 (DA, FC). INDIANA: on wall of cave, Elkhorn falls near Richmond, L. J. King 201, 8 Sept. 1940 (EAR, FC). WISCONSIN: sphagnum bogs near Trilby and Sand lakes, Vilas county, G. W. Prescott 3W58, 3W278, 15 Aug., 2 Sept. 1938 (FC).

MISSOURI: Sagamout, 2 miles south of Saginaw, Newton county, E. J. Palmer M43, 31 Jul. 1953 (D). ILLINOIS: in Thompson's lake at waterworks, Carbondale, W. B. Welch CWT, 23 Jul. 1941 (FC). ARIZONA: at waterfall, Bull Durham canyon, Lake Meade, Coconino county, E. U. Clover 157, 9 Sept. 1940 (FC, MICH). NEVADA: in tepid pool, Steamboat hot springs, Washoe county, M. J. Groesbeck 114, 192, 13 Jun., 4 Sept. 1940 (FC). CALIFORNIA: fresh water, Lemmon, 1877 (D, FH); in cold spring and pools, travertine quarry at Bridgeport, Mono county, Groesbeck 175, 265, 472, 3 Sept., 24 Nov. 1940, 8 Jul. 1941 (FC).

BAHAMA ISLANDS: on rocks in tide-pool, Eight Mile Rock, Great Bahama, M. A. Howe 3694, Feb. 1905 (NY). PUERTO RICO: on limestone, Arecibo to Hatillo, N. Wille 1377 (Type of *Gloeocapsa cartilaginea* var. *minor* Gardn., NY), 1377a (Type of *Gloeotheca prototypa* Gardn., NY [Fig. 171]), 1377b (Type of *Synechocystis primigenia* Gardn., NY), 1378, 1378a, Feb. 1915 (NY); on limestone, Arecibo to Uruado, Wille 1481a, Mar. 1915 (NY); in depressions in limestone, Haro Arriba near Arecibo, Wille 1407a (Type of *Apphanotheca bacilloidea* Gardn., NY), 1407b, Mar. 1915 (NY); in a water pipe near a stream, Maricao, Wille 1147, 1147c, Feb. 1915 (FC, FH, NY). ST. VINCENT: [on damp wall of dam, Sharp's River], W. R. Elliott 477 (Type of *Gloeotheca lunata* W. & G. S. West, with *Cosmarium pseudopyramidatum* in the slide collection, BM). HONDURAS: on wet masonry, vicinity of El Zamorano, dept. Morazán, P. C. Standley 4423, Feb.-Mar. 1947 (FC). PERU: Lima, A. Maldonado 2, Dec. 1940 (FC); agua estanciada cerca mar, Lago Villa, Maldonado 67, Jan. 1942 (FC). NEW ZEALAND: caves, Piha, V. J. Chapman, Apr. 1947 (FC). PHILIPPINES: hot spring, College, Laguna, G. T. Velasquez 2462, 8 Aug. 1948 (FC, PUH). CHINA: on rock in rapid streams, Omei-shan and Shan-Shan-Kow, Omei, Szechwan, H. Chu 1329, 1329a, Aug. 1941, 21 Aug. 1942 (FC). INDONESIA: op de wand de grot bij Brabakan, W. Docters van Leeuwen, Nov. 1913 (L); in the caves where the edible swallows' nests are collected, Borneo, comm. Holmes (PC).

GENUS 2. ANACYSTIS

Meneghini, Consp. Algol. Eugan., p. 324. 1837. *Microcystis* Unterabtheilung *Anacystis* Kützing, Tab. Phyc. 1: 7. 1846. *Polycystis* Sectio *Anacystis* Hansgirg, Prodr. Algenfl. Böhmen 2: 144. 1892. —Type species: *Anacystis marginata* Menegh.

Pleurococcus Meneghini, Consp. Algol. Eugan., p. 337. 1837. —Type species: *P. communis* Menegh. Nägeli in Gatt. Einzell. Alg., p. 64 (1849) names "*P. vulgare* Menegh. part." as the Typus of "*Pleurococcus* Menegh. part.", but it seems to us that attaching part of a name to part of a type is an impossibility under the present International Rules of Nomenclature. We have designated as the Type species here one of the species described at the same time as the genus.

Gloeocapsa Kützing, Phyc. Gener., p. 173. 1843. *Gloeocapsa* Subgenus *Eugloeocapsa* Hansgirg, Notarisia 3: 589. 1888. *Gloeocapsa* Sectio *Eugloeocapsa* Hansgirg, Prodr. Algenfl. Böhmen 2: 152. 1892. *Gloeocapsa* Sectio *Hyalocapsa* Kirchner in Engler & Prantl, Natürl. Pflanzenfam., ed. 1, 1(1a): 54. 1898. —Type species: *Gloeocapsa atrata* Kütz. See Drouet in Doty, Lloydia 13: 9, footnote (1950).

Sorospora Hassall, Hist. Brit. Freshw. Alg. 1: 309. 1845. —Type species: *Ulva montana* Lightf.

Microcystis Unterabtheilung *Polycystis* Kützing, Tab. Phyc. 1: 7. 1846. *Polycystis* Kützing, Sp. Algar., p. 210. 1849; non Léveillé, 1846. *Diplocystis* Trevisan, Sagg. Monogr. Alg. Coccot., p. 40. 1848; nec Berkeley & Curtis, 1869; nec J. Agardh, 1896; nec Cleve, 1900. *Clathrocystis* Henfrey, Trans. Microsc. Soc. London, N. S., 4: 53. 1856. *Polycystis* Sectio *Clathrocystis* Hansgirg, Prodr. Algenfl. Böhmen 2: 146. 1892. —Type species: *Micraloa aeruginosa* Kütz.

Cagniardia Trevisan, Sagg. Monogr. Alg. Coccot., p. 47. 1848. —Type species: *Palmella cyanea* Kütz.

Chroococcus Nägeli, Gatt. Einzell. Alg., p. 45. 1849. *Chroococcus* Subgenus *Euchroococcus* Hansgirg, Notarisia 3: 589. 1888. *Chroococcus* Sectio *Euchroococcus* Hansgirg, Prodr. Algenfl. Böhmen 2: 161. 1892. —Type species: *Protococcus rufescens* Kütz. (= *Chroococcus rufescens* Näg.).

Monocapsa Itzigsohn in Rabenhorst, Alg. Sachs. 27—28: 263. 1853. —Type species: *M. stegophila* Itzigs.

Rhodococcus Sectio *Rhodocapsa* Hansgirg, Oesterr. Bot. Zeitschr. 34: 315. 1884. —Type species: *Gloeocapsa violacea* Kütz.

Eucapsis Clements & Shantz, Minn. Bot. Stud. 3: 134. 1909. *Chroococcus* Subgenus *Eucapsis* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 68. 1923. —Type species: *Eucapsis alpina* Clem. & Shantz.

Endospora Gardner, Mem. New York Bot. Gard. 7: 27. 1927. —Type species: *E. rubra* Gardn.

Chroococcidiopsis Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 625. 1933. —Type species: *C. thermalis* Geidl.

Radiocystis Skuja, Symbolae Bot. Upsal. 9(3): 43. 1948. —Type species: *R. geminata* Skuja.

Original specimens of the type species for the following generic and sub-generic names have not been available to us for study:

Aplococcus Roze, Journ. de Bot. 10: 321. 1896. —Type species: *A. natans* Roze.

Gloeocapsa Sectio *Cyanocapsa* Kirchner in Engler & Prantl, Natürl. Pflanzenfam., ed. 1, 1(1a): 54. 1898. *Gloeocapsa* Subgenus *Cyanocapsa* Kirchner ex Forti, Syll. Myxophyc., p. 39. 1907. —Type species: *Protococcus violasceus* Corda.

Coelosphaeriopsis Lemmermann, Abh. Nat. Ver. Bremen 16: 353. 1899. —Type species: *C. halophila* Lemm.

Planosphaerula Borzi, Nuova Notarisia 1905: 20. 1905. —Type species: *P. natans* Borzi.

Myxosarcina Printz, K. Norske Vidensk. Selsk. Skr. 1920(1): 35. 1920. —Type species: *M. concinna* Printz.

Sphaerodictyon Geitler, Beih. z. Bot. Centralbl., II, 41: 231. 1925. —Type species: *Polycystis reticulata* Lemm.

Plantae microscopicae vel macroscopicae, cellulis in divisione binis plus minusve hemisphaericis, aetate provecta globosis, per gelatinum vaginale irregulariter vel in seriebus in tribus planis unoquodque ad alia perpendicularibus distributis; divisionibus cellularum seriatim in tribus planis unoquodque ad alia perpendicularibus procedentibus; gelatino vaginale hyalino vel deinde (in *A. montana*) rubrescentes vel coerulescentes vel lutescentes.

In species of *Anacystis* the spherical cells divide successively in three planes perpendicular to each other. The cells thus formed become irregularly distributed through the gelatinous matrix or retain a regular cubical (eucapsoid) arrangement, distributed in series of rows in three planes perpendicular to each other. Bacteria, palmelloid Chlorophyceae and Rhodophyceae, and growth-forms of Nostocaceae and *Entophrysalis* spp. are often mistaken as species of *Anacystis*.

Key to species of *Anacystis*:

1. Cells without pseudovacuoles, plants not developing as water blooms..... 3.
1. Cells containing pseudovacuoles, plants developing as water blooms 2.
2. Cells (2.5—)3—7(—10) μ in diameter 1. *A. CYANEA*
2. Cells 0.5—2 μ in diameter 2. *A. INCERTA*
3. Cells 0.5—2 μ in diameter 3. *A. MARINA*
3. Cells larger 4.
4. Cells up to 6 μ in diameter (larger where parasitized by fungi), the gelatinous matrix developing red, blue, or yellowish-brown pigments in aerial and subaerial habitats 4. *A. MONTANA*
4. Cells 6 μ in diameter or more, gelatinous matrix hyaline 5.
5. Cells (8—)12—50 μ in diameter, usually remaining angular after division 5. *A. DIMIDIATA*
5. Cells chiefly 6—12 μ in diameter, soon becoming spherical after division.... 6.
6. Plants marine, usually macroscopic 6. *A. AERUGINOSA*
6. Plants of fresh water, usually microscopic 7. *A. THERMALIS*

1. *ANACYSTIS CYANEA* Drouet & Daily, Butler Univ. Bot. Stud. 10: 221. 1952. *Palmella cyanea* Kützing, Phyc. Gener., p. 172. 1843. *Cagniardia cyanea* Trevisan, Sagg. Monogr. Alg. Coccot., p. 47. 1848. —Type from Jever, Germany (L).

Micraloa aeruginosa Kützing, Linnaea 8: 371. 1833. *Sphaerothermium aeruginosum* Kützing pro synon., ibid. p. 370. 1833. *Microcystis ichthyoblabe* Kützing, Phyc. Gener., p. 170. 1843. *Palmella ichthyoblabe* Kunze pro synon. in Kützing, loc. cit. 1843. *Micraloa ictyolabe* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 48, 104. 1843. *Palmella ictyolabe* Kunze pro synon. ex Meneghini, loc. cit. 1843. *Microcystis aeruginosa* Kützing, Tab. Phyc. 1: 6. 1846. *Micraloa ichthyoblabe* Rabenhorst, Deutschl. Krypt.-Fl. 2(2): 13. 1847. *Diplocystis aeruginosa* Trevisan, Sagg. Monogr. Alg. Coccot., p. 40. 1848. *D. ichthyoblabe* Trevisan, loc. cit. 1848. *Polycystis ichthyoblabe* Kützing, Sp. Algar., p. 210. 1849. *P. aeruginosa* Kützing, loc. cit. 1849. *Clathrocystis aeruginosa* Henfrey, Trans. Microsc. Soc. London, N. S., 4: 53. 1856. *Microhaloa aeruginosa* Kützing ex Rabenhorst, Fl. Eur. Algar. 2: 54. 1865. *Polycystis elabens* var. *ichthyoblabe* Hansgirg, Prodr. Algenfl. Böhmen 2: 145. 1892. —Type from Stuttgart, Germany (L). FIG. 9.

Polycystis viridis A. Braun in Rabenhorst, Alg. Eur. 141 & 142: 1415. 1862. *Microcystis viridis* Lemmermann, Abh. Nat. Ver. Bremen 17: 342. 1903. *M. aeruginosa* f. *viridis* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 106. 1938. —Type from Salzgungen, Germany (B).

Chroococcus indicus Zeller, Jour. Asiatic Soc. Bengal 42(2): 176. 1873; Hedwigia 12: 168. 1873. —Type from Prome, Burma (L). FIG. 8.

Polycystis prasina Wittrock in Wittrock & Nordstedt, Alg. Exs. 6: 297. 1879. *P. flos-aquae* var. *prasina* Wittrock ex Hansgirg, Prodr. Algenfl. Böhmen 2: 144. 1892. *Microcystis prasina* Lemmermann, Ark. f. Bot. 2(2): 146. 1904. *Clathrocystis prasina* Woronichin, Not. Syst. Sect. Crypt. Inst. Bot. Acad. Sci. U. R. S. S. 6(1—6): 39. 1950. —Type from Uppland, Sweden (S). FIG. 6.

Polycystis flos-aquae Wittrock in Wittrock & Nordstedt, Alg. Exs. 6: 298. 1879. *P. flos-aquae* f. *autumnalis* Wittrock ex Lemmermann, Krypt.-Fl. Mark Brandenburg 3: 75. 1907. *Microcystis flos-aquae* Kirchner ex Forti, Syll. Myxophyc., p. 86. 1907. *M. aeruginosa* f. *flos-aquae* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 103. 1938. —Type from Dalsland, Sweden (S). FIG. 4.

Microcystis caerulea Dickie, Journ. Linn. Soc. Bot. 18: 128. 1880. —Type from Rio Tapajoz, Brazil (BM).

Polycystis scripta Richter, Hedwigia 25: 254. 1886. *P. flos-aquae* var. *scripta* Hansgirg, Prodr. Algenfl. Böhmen 2: 144. 1892. *Microcystis scripta* Migula, Krypt.-Fl. Deutschl. II. Alg. 1a: 37. 1905. *M. aeruginosa* f. *scripta* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 103. 1938. —Type from Halle, Germany (B). FIG. 2.

Polycystis aeruginosa var. *major* Wittrock ex Hansgirg, Prodr. Algenfl. Böhmen 2: 146. 1892. *Clathrocystis aeruginosa* f. *major* Keissler, Oesterr. Bot. Zeitschr. 56: 56. 1906. *C. aeruginosa* var. *major* Wittrock ex Forti, Syll. Myxophyc., p. 95. 1907. *Microcystis aeruginosa* var. *major* Wittrock ex Lemmermann, Krypt.-Fl. Mark Brandenburg 3: 76. 1907. *M. aeruginosa* f. *major* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 3: 15. 1924. —Type from Libochowitz, Bohemia (W). FIG. 7.

Polycystis (Clathrocystis) insignis Beck, Mus. Vindob. Krypt. Exs. 2: 227. 1896. —Type from Bombay, India (W). FIG. 10.

Polycystis ochracea Brand, Ber. Deutsch. Bot. Ges. 16: 200. 1898. *Microcystis ochracea* Forti, Syll. Myxophyc., p. 86. 1907; Lemmermann, Krypt.-Fl. Mark Brandenburg 3: 76. 1907. *M. aeruginosa* f. *ochracea* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 103. 1938. —Type from Wurmsee, Bavaria, Germany (B). FIG. 3.

Clathrocystis robusta Clark, Proc. Biol. Soc. Washington 21: 94. 1908. *Microcystis robusta* Nygaard, Dansk Bot. Ark. 4(10): 8. 1925. *M. aeruginosa* var. *robusta* Nygaard and *M. flos-aquae* var. *robusta* Nygaard, K. Danske Videnskab. Selsk. Skr. 7(1): 185. 1949. —Type from Lake Amatitlan, Guatemala (FC). FIG. 11.

Microcystis protocystis Crow, New Phytol. 22: 62. 1923. *M. aeruginosa* f. *protocystis* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 106. 1938. —Type from Anuradhapoor, Ceylon (in the collection of P. E. Fritsch). FIG. 5.

Microcystis aeruginosa var. *major* Elenkin, Not. Syst. Crypt. Hort. Bot. Reipubl. Ross. 3: 15. 1924. —Isotypes from Uppland, Sweden (FC, L, MICH).

Microcystis aeruginosa f. *occidentalis* W. R. Taylor, Amer. Journ. Bot. 15: 606. 1928. —Type from Flagstaff, Arizona (TA).

Microcystis toxica Stephens, Trans. Roy. Soc. So. Africa 32(1): 107. 1949. —Type from Vaaldam, Transvaal (L). FIG. 1.

Eucapsis alpina f. *violacea* Thomasson, Svensk Bot. Tidskr. 46: 233. 1952. —Isotype from Bessvatn, Sweden (DA).

Original specimens have not been available to us for the following names;

their original descriptions are here designated as the Types until the specimens can be found:

Coelosphaerium dubium Grunow in Rabenhorst, Fl. Eur. Algar. 2: 55. 1865. —Only a sketch with descriptive notes is present in the herbarium of A. Grunow in the Naturhistorisches Museum, Vienna. The material discussed by Schmida from Graz, Styria, is cited among the specimens below (see Hedwigia 37, Beibl. 1: 47. 1898).

Microcystis pseudofilamentosa Crow, New Phytol. 22: 64. 1923. *M. aeruginosa* f. *pseudofilamentosa* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 105. 1938.

Microcystis aeruginosa f. *minor* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Reipubl. Ross. 3: 15. 1924.

Microcystis fusca Zalesky, R v. G n. de Bot. 38: 33. 1926.

Microcystis ramosa Bharadwaja, Proc. Indian Acad. Sci. 2: 96. 1935.

Microcystis aeruginosa var. *elongata* B. Rao, Proc. Indian Acad. Sci. 6: 341. 1937.

Microcystis aeruginosa f. *sphaerodictyoides* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 100. 1938.

Microcystis botrys Teiling, Bot. Notiser 1942: 63. 1942.

Microcystis flos-aquae var. *major* Nygaard, K. Danske Videnskab. Selsk. Biol. Skr. 7(1): 179. 1949.

Microcystis lutescens Schiller, Sitzungsber. Oesterr. Akad. Wiss., Math.-Nat. Kl., 1, 163: 112. 1954.

Microcystis punctata Schiller, Sitzungsber. Oesterr. Akad. Wiss., Math.-Nat. Kl., 1, 163: 118. 1954.

Plantae smaragdinae vel laete aeruginosae, microscopicae, sphaericae, cylindraceae, vel ovoideae, varie et irregulariter lobatae et invaginatae vel clathratae, saepe conferte confluentes, planctonicae, cellulis in divisione binis depresso—sub-sphaericis, aetate provecta globosis diametro [2.5—]3—7[—10.5] μ crassis, sine ordine (aut in seriebus eucapsoideis) per gelatinum vaginale distributis; gelatino vaginale hyalino, homog neo, ad superficiem distincte delimitato vel (saepe omnino) diffuente; protoplasmate dilute aerugineo, pseudovacuolis farcto. FIGS. 1—11.

In the plankton of freshwater lakes, ponds, and sluggish rivers, often appearing as conspicuous and heavy water blooms during the warm seasons of the year. The morphology, life history, and synonymy of this species have been discussed by Drouet & Daily in Field Mus. Bot. Ser. 20: 67—83 (1939). In pure cultures, the gelatinous matrix hydrolyzes completely and the cells become less pseudovacuolate than is characteristic of them in natural habitats. Often confused with this species are the various growth-forms of the bacterial *Lamprocystis rosea* (K tz.) Dr. & Daily, the plants of which contain a red pigment in most living collections; this pigment is often lost in material preserved in liquid.

Specimens examined:

LATVIA: Riga, H. Skuja, 24 Aug. 1924 (DA, FC). SWEDEN: on lacu Kalungen Daliae, V. Wittrock, Aug. 1866 (Type of *Polycystis flos-aquae* Witt. in Witt. & Nordst., Alg. Exs. no. 298, S; isotypes, FC [Fig. 4], L, MIN, NY), 25 Aug. 1862 (D, S), Sept. 1882 (as *P. flos-aquae* in Witt. & Nordst., Alg. Exs. no. 509, D, FC, L, MIN, NY), Jun. (as *Applanocapsa pulchra* in Aresch., Alg. Scand. Exs., Ser. Nov., no. 388, FC); in lacu M laren ad Flottsund Uplandiae, Wittrock, 3 Nov. 1878 (Type of *Polycystis prasina* Witt., S[Fig. 6]; isotypes, FC, L, MICH, TA, US); Bessvatn, K. Thomasson, 18 Jul. 1951 (isotype slide of *Eucapsis alpina* f. *violacea* Thomasson from the author, DA); in lacu L tsj n par. Funbo Uplandiae, Wittrock, 6 Oct. 1878 (isotypes of *Microcystis aeruginosa* var. *major* Elenk. as *Polycystis aeruginosa* in Witt. & Nordst., Alg. Exs. no. 296, FC, L, MICH), Oct. (as *P. aeruginosa* in Aresch., Alg. Scand. Exs., Ser. Nov., no. 429, FC, L); pond, N tesj , Malm hus, B. Carlin-Nilsson 525, 17 Aug. 1937 (D, NY); Dagstorpssj n, Malm hus, Carlin-Nilsson 140, 25 Aug. 1931 (D, NY); lake, Fiolen, Kronoberg, Carlin-Nilsson 516, 27 Jul. 1937 (D, NY); Hammarbysj  in Danviken, Stockholm, G. Lagerheim, 1882 (D, S); Ringsj n ad Bosj kloster, O. R. Holmberg, Sept. 1913 (S); in lacu ad Mullsj  Vestrogothiae, O. Nordstedt, Aug. 1900 (B, NY); Treh rningsj , Upland, O. Borge, Sept. 1896 (NY); with *Anacystis incerta* in lacu Wombsj n Scaniae, Nordstedt, Jun. 1901 (B, NY, S, UC). DENMARK: in lacu prope Birker d Selandiae, C. Ostensfeld-Hansen, 30 Aug. 1896 (D, C); Sj n Naerum, C. Rasch, Jun. 1880 (C); Liller d, Sj lland, T. Rosenvinge, Sept. 1879 (C); Hut-s , J. Schmidt, Sept. 1898 (C); Hofmangsgave, Fionen, Hofman-Bang (B). POLAND: Ockelsee bei Allenstein, Caspary, Aug. 1862

(B); Danzig, *Klinsmann*, 1858 (B); Sawadda-See (Westpreussen), *P. Hennings*, Sept. 1890 (B); Galgenberge bei Strehlen (Schlesien), *Hilse* (as *Anacystis marginata* in Rabenh. Alg. no. 1522, B, FC, L, NY), Jul. 1859 (as *Polycystis aeruginosa* in Rabenh. Alg. no. 1174, B, FC, MIN, NY); Strehlen, *Hilse* (B, L); bei Habendorf, *Hilse* 8 (B); am Grossteiche von Habendorf bei Reichenbach, *Hilse*, Sept. 1862 (B); Rausern bei Breslau, *W. Migula*, Jul. 1877 (as *P. aeruginosa* in Hauck & Richt., Phyk. Univ. No. 296a, L, MIN), May 1887 (as *Microcystis aeruginosa* in Mig., Krypt. Germ., Austr., & Helv. Exs., Alg. no. 30, MICH, NY, TA); Breslau, *O. Kirchner*, 1874 (as *Clatbrocystis aeruginosa* in Rabenh. Alg. no. 2424, FC, L, MIN, NY, TA); im Teiche bei Schoffschütz in Oberschlesien, *A. Ugenannt* & *S. Schmula*, Sept. 1895 (as *Polycystis elabens* in Hauck & Richt., Phyk. Univ. no. 684, L, MIN, NY); Teich in Buchwald bei Schmiedeberg, *G. Hieronymus*, Sept. 1887 (B).

GERMANY: Baden: aus dem Grünloch in Ichenheim, *L. Leiner*, Sept. 1858 (as *P. aeruginosa* in Jack, *Leiner*, & *Strizenb.*, Krypt. Badens no. 461, FC, YU). Bavaria: Nürnberg, *P. Reinsch* (MICH); in Wassertümpeln bei Erlangen, *Glück*, Sept. 1895 (L, US); Erlangen, *Reinsch* (L, NY, US); Wurmsee, *F. Brand*, Sept. 1897 (Type of *P. ochracea* Brand, B [Fig. 3]). Brandenburg: Wannensee, *P. Hennings*, Sept. 1892 (Henn., Phyk. March. no. 47c, B, FH); Halensee, *Hennings*, Nov. 1890 (Henn., Phyk. March. no. 47b, B, FH); Wilmersdorfer See, Berlin, *Hennings*, Jul. 1882 (Henn., Phyk. March. no. 47a, B, FH); Müggel-See, Friedrichshagen, *Hennings*, Aug. 1892 (B), Sept. 1892 (Henn., Phyk. March. no. 47d, B, FH), *A. Braun* (B); in der Havel bei der Pfaueninsel, *Braun*, Aug. 1863 (B), bei Potsdam, *Bauer* (B, D, FH, L, NY), *L. Rabenhorst*, Jul. 1857 (L); Berlin, *Braun*, Aug. 1854 (B, L), *Jahn*, 1857 (B); Hort. Berol., *Braun*, Aug. 1852 (B); Golsen, *Schumann*, Jul. 1865, 1866 (B); Grunewald-See bei Berlin, *G. Hieronymus*, Aug. 1891 (B); in einem Graben, Neudamm, *Izizsohn*, May 1855 (B); im Tempelhofer Parkteiche bei Berlin, *Hennings*, Jul. 1883 (B; Henn., Phyk. March. no. 46, B, FH). Hamburg: Aussenalster, *Fitschen*, Jul. 1906 (S). Mecklenburg-Pomerania: Wolgast-See bei Haeringsdorf, *A. Braun*, Sept. 1864 (B, L). Oldenburg: Jever, *Jürgens* (Type of *Palmella cyanea* Kütz., L). Saxony: Teiche in Bernbruch bei Lausigk, *P. Richter*, Jul. 1864 (as *Coelosphaerium Kuetzingianum* in Rabenh. Alg. no. 1791, FC); Mannsfeld, *M. Marsson*, Jul. 1896 (NY); Leipzig, Lindenau, *Marsson*, Sept. 1897 (NY); Teich in Collau am Mulde, *Marsson*, Sept. 1897 (NY); Gohlis bei Leipzig, *Richter*, Sept. 1878 (NY), *Auerswald*, Sept. 1852 (B); in lacu salso Mansfeldensis prope Halam, *P. Richter* (Type of *Polycystis scripta* Richt. in Hauck & Richt., Phyk. Univ. no. 92, B [Fig. 2]; isotypes, L, MIN); Brösen bei Grimma, *Richter*, Aug. 1894 (in Hauck & Richt., Phyk. Univ. no. 748a, L, MIN, NY); in einem Teiche bei Anger, Leipzig, *Richter*, Aug. 1879 (L, PH, TA); auf Teichen, Mortizburg (L); auf einem Fischteiche, Ponickau, *Auerswald* (B, FC, FH, NY), 27 Jul. 1852 (as *P. ichthyoblabe* in Rabenh. Alg. no. 210, B, FC, L, MIN, NY); Leipzig (Lipsiae), *Kunze* (B, FC, NY, PH), *Auerswald* (FC), *Richter* (FC); in einem Graben am Grossen Garten in Dresden, *C. Schiller*, Jul. 1888 (in Hauck & Richt., Phyk. Univ. no. 296b, L, MIN); Schadebach bei Makranstadt (Leipzig), *H. Reichels* (in Hauck & Richt., Phyk. Univ. no. 297, L, MIN); Burgsee bei Salzungen, *A. Braun*, Sept. 1862 (Type of *Polycystis viridis* A. Br. in Rabenh. Alg. no. 1415, B; isotypes, FC, L, MIN, NY); Salzunger See, *A. Röse* (as *Microhaloa firma* in Rabenh. Alg. no. 453, FC, FH, L, NY, UC); Salzsee bei Halle, *O. Kuntze* (NY). Thuringia: Georgental, in einem Teich am Bahnhof, *W. Migula*, 1 Sept. 1928 (as *Microcystis aeruginosa* in Mig., Krypt. Germ., Austr., & Helv. Exs., Alg. no. 242, FC, TA). Württemberg: Stuttgart, *G. von Martens* (Type of *Microhaloa aeruginosa* Kütz., L [Fig. 9]; isotypes, B, L, NY, UC), Jun. 1827, Aug. 1830, Aug. 1947 (B).

CZECHOSLOVAKIA: Moravia: près Eisgrub (L). Bohemia: Bystrice u Benesova, rybníky u drahý, *A. Hansgirk*, Aug. 1884 (FC, W); piscina Velký Pálenec prope Blatná, *B. Fott*, 4 Aug. 1948 (FC); Chlumec—Pílar, blíz stánie, *Hansgirk*, Aug. 1887 (FC, W); Schlossteich in Cimelic, *Hansgirk*, Aug. 1887 (FC, W); Dobříš, *Hansgirk*, Aug. 1886 (FC, W); the Great Pond of Doksy, *Fott*, 12 Jul. 1947 (FC); Krivoklát, *Hansgirk*, Sept. 1884 (FC, W); Amalienhof u Krivokláta, *Hansgirk*, Sept. 1884 (FC, W); Gumnitzsee, Joachimstal, *W. Panknin*, Aug. 1937 (B); bei Libochowitz, *Hansgirk*, Jul. 1888 (Type of *Polycystis aeruginosa* var. *major* Witr., W; isotype, FC [Fig. 7]); in Dolejší pond near Lnáře, *Fott*, 15 Aug. 1947 (FC); pond Mlýnský near Lnáře, *Fott*, 3 Aug. 1947 (FC); Nepomuk, *Hansgirk*, Aug. 1887 (FC, W); Stráncice, *Hansgirk*, Sept. 1885 (FC, W); Teplice, *Hansgirk*, Jul. 1883 (FC, W); pond Starý Hospidár near Trebon, *Fott*, 19 Jun. 1946 (FC); pond Velká Kus, *Fott*, 2 Aug. 1947 (FC); Planina a Zíc u Chlumec blíz Treboné, *Hansgirk*, Sept. 1887 (FC, W). AUSTRIA: Teich im Schwarzenberggarten, Wien, *K. Rehbinger*, Jun. 1907 (as *Coelosphaerium dubium* in Mig., Krypt. Germ., Austr., & Helv. Exs., Alg. no. 154, MICH, TA); Vindobonae in piscinis horti Caesaréi Schönbrunn, *C. de Keissler* (as *Clatbrocystis aeruginosa* in Mus. Vindob. Krypt. Exs. no. 1517, B, FC, L, NY, US); Vindobonae in piscinis hortorum publicorum, *Rehbinger* (as *Microcystis flos-aquae* in Mus. Vindob. Krypt. Exs. no. 2335, B, FC, L, NY); in lacu Hilmteich ad Graz, *Schmula* (as *Coelosphaerium dubium* in Kerner, Fl. Exs. Austro-Hung. no. 3196, FC, L, MO); Ober-Premstätten—Liebach prope Graz, *Hansgirk*, Sept. 1890 (FC, W). HUNGARY: Budapest in lacu Városligeti tó, *F. Filárszky* (as *Polycystis aeruginosa* in Mus. Vindob. Krypt. Exs. no. 226, B, FC, L, NY); Budapest in excavationibus Lágymányosi holt Dunaág, *Filárszky*, May 1911 (Fl. Hungar. Exs. Alg. no. 21, FC, L, US). TRIESTE: ex herb. Hauck (D, FH, NY). SWITZER-

LAND: Zürich, Katzenssee, auf dem Grunde am Strande liegend, K. von Nägeli (ZT). ITALY: in una vasca all'Orto Botanico di Pisa, Savi, 1865 (UC). NETHERLANDS: Haagse Bosch, den Haag, W. F. R. Suringar D18, May 1857 (D, L); Witte Singel, Leiden, J. T. Koster 233, 11 Aug. 1938 (FC, L); in aq. dulc. stagn. Ludg.-Batav. (Leiden), van den Bosch 376, Aug. 1846 (B, L); Holland, A. Weber-van Bosse, Oct. 1891 (L); forest, The Hague, W. Trelease, Jun. 1884 (MO); de Kaag, op de plas, Koster 953 (L); Rotterdam, Kralingse plas, J. Poolman, Jul. 1944 (L); Noorden, sloot langs de weg, Koster 501, Jun. 1940 (L); Kolkven, Oisterwijk, G. P. H. van Heusden, 17 May 1947 (FC, L). FRANCE: Falaise, Calvados, A. de Brébisson (B), Brébisson 528, 594 (L); Carentan, Manche, à la surface du canal de l'hospice, herb. Lebel (B, FC); dans un étang du parc du Château de Flamanville, Manche, P. Frémy, 10 Aug. 1932 (as *Microcystis aeruginosa* in Hamel, Alg. de Fr. no 151, FC); hortus, Clermont-Ferrand, W. F. R. Suringar (FC, L); Angers, Maine et Loire, F. Hy (B).

PORTUGUESE EAST AFRICA: Maloti lake near Masiyeni, S. Chopiland, E. L. Stephens 38, 27 Jun. 1928 (D, NY). UNION OF SOUTH AFRICA: Transvaal: Hartbeestpoort dam, Mrs. G. E. Hutchinson 15, 29 Apr. 1928 (D); Rietkuil, Bethal district, M. E. Blenkiron & D. Weintraub 24, 25 Feb. 1928 (D); Vaaldam, E. L. Stephens, Apr. 1945 (Type of *Microcystis toxica* Steph., L; isotype, FC [Fig. 1]). Cape of Good Hope: Zeekoe Vlei near Cape Town, Mrs. Hutchinson 35, 5 Feb. 1928 (D).

MASSACHUSETTS: Arlington, E. Dewart, 27 Jul. 1891 (FC, NY); cemetery pond, Belmont, A. B. Seymour, Sept. 1918 (FC); Herring Run, Brewster, L. Walp, Aug. 1940 (FC); Fresh pond, Cambridge, W. G. Farlow, Oct. 1882 (FH, MO), 25 Oct. 1879 (FC), G. T. Moore, Oct. 1893 (B), H. H. Bartlett 1179, Oct. 1907 (MICH), A. H. Moore 4090, 11 Oct. 1907 (FC), A. B. Seymour, Jul. 1913 (FC); pond, Cuttyhunk island, F. S. Collins 5723, Aug. 1907 (NY); pond south of Nonquitt, Dartmouth, E. T. Rose & F. Drouet 1891, 18 Jul. 1936 (D); Fresh pond, Falmouth, W. R. Taylor, Jul. 1921 (TA), T. E. Hazen 5, 6 Jul. 1926 (DA, FC); Oyster pond, Falmouth, Taylor, 12 Aug. 1922 (FC, TA), Drouet 2118, 30 Jul. 1937 (D, FH, NY, S), J. Bader 84 (FC), 129 (D), Jul. 1938; Episcopal Ocean, Falmouth, Rose & Drouet 1867, 4 Jul. 1936 (D, NY, S), C. M. Palmer, 2 Sept. 1937 (DA, FC), R. N. Webster, 20 Jun. 1938 (D, FH, NY), Bader 127, 30 Jul. 1938 (D); Shivericks pond, Falmouth, E. T. Moul 6409, 2 Aug. 1949 (FC); basin no. 3, Framingham, Farlow, Nov. 1881 (FH); Ashumer lake northeast of Hatchville, Moul 6404, 27 Jun. 1949 (FC); Hummock pond, Nantucket island, W. R. Taylor, 1920 (FC, TA); Long pond, Nantucket, Taylor & B. F. D. Runk, 17 Jul. 1938 (D); Hammond pond, Newton, H. M. Richards, Oct. 1889 (NY); Horn pond, Woburn, Farlow, 2 Aug. 1879 (FC, D, FH). RHODE ISLAND: Mashapaug pond, Providence, W. J. V. Osterhout, 15 Oct. 1892 (as *Clathrocystis aeruginosa* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 51, FC, L, MICH, MIN, NY); Providence, Nichols, 1877 (D, FH); Haley's pond, Cranston, F. S. Collins 6444, Sept. 1911 (NY). CONNECTICUT: plankton of Smith Brothers pond, central Connecticut, G. E. Hutchinson, 22 Dec. 1942 (FC). NEW YORK: Central park, New York City, Jul. 1865 (B); in Basic reservoir, Rensselaerville, M. S. Markle 25, Jul. 1947 (EAR, FC). NEW JERSEY: small woodland lake 2 miles north of Glenwood, Sussex county, E. T. Moul 7169, 18 Oct. 1950 (FC). PENNSYLVANIA: pond north of Kennett Square, F. W. Pennell & W. S. May, Oct. 1921 (TA); plankton of Shenango river, Pymmatuning Dam, Greenville, Clarksville, Sharon, and Wheatland, L. Walp & W. Murchie 6—15, Jul. & Sept. 1941 (FC).

VIRGINIA: in Queens Creek (Haw Tree Landing), York county, A. F. Chestnut, 8 Sept. 1942 (FC, ST). SOUTH CAROLINA: in Lake Chapin near Myrtle Beach, Horry county, P. J. Philson SC72, 21 Sept. 1938 (FC). FLORIDA: Gainesville, M. A. Brannon 11, 12, 25, 27, 227b, 365, 419, 422—426, Sept. 1941—May 1947 (FC, PC); Lake City, R. K. Strawn 589, 2 Aug. 1947 (FC, PC); in Lake Harris, Leesburg, Lake county, F. Drouet & Brannon 11049, 11053, 11056, 11062, 19 Jan. 1949 (FC); Henderson camp (Lee county?), O. Tollin, May 1886 (S). ONTARIO: Bay of Quinte, Lake Ontario, Prince Edward county, A. Tucker, 1946 (DA, FC); Clear lake, Kawartha lakes, Peterborough county, W. A. Strow, 26 Aug. 1951 (DA, FC). OHIO: Auglaize county: St. Mary's lake, St. Marys, W. A. & F. K. Daily 633, 634, 22 Jul. 1940 (DA, FC). Franklin county: Goodale park, Columbus, E. H. Ahlstrom, 17 Oct. 1933 (DA, FC). Hamilton county: pure culture no. 15 (from G. C. Gerloff, culture no. 1036) in Environmental Health Center, Cincinnati, C. M. Palmer (FC); pond in Arlington cemetery, Cincinnati, W. A. Daily & J. H. Hoskins 109, 4 Oct. 1939 (DA, FC), Daily 418, 5 Jul. 1940 (DA, FC), W. A. & F. K. Daily 741, 2 Sept. 1940 (DA, FC), E. Ward, 18 Jul. 1938 (DA, FC); lake in Burnet Woods, Cincinnati, Daily & A. Bickler 104, 1 Oct. 1939 (DA, FC); Sharon Woods lake, Cincinnati, W. A. & F. K. Daily 743, 2 Sept. 1940 (DA, FC). Defiance county: in canal, Independence state park, east of Defiance, W. A. & F. K. Daily 642, 23 Jul. 1940 (DA, FC). Ottawa county: Lake Erie, Put-in-Bay, C. E. Taft, 1935, 3 Aug. 1938 (DA, FC), near Gibraltar Isle, Daily & Taft 649A, 24 Jul. 1940 (DA, FC); pond, Port Clinton, F. K. & W. A. Daily 648, 23 Jul. 1940 (DA, FC). Putnam county: in ponds, Erie-Miami canal, Delphos, W. A. & F. K. Daily 635, 636, 22 Jul. 1940 (DA, FC); in Auglaize river at Cascade park near Dupont, W. A. & F. K. Daily 640, 22 Jul. 1940 (DA,

FC). Stark county: in reservoir, Beach City, *W. A. & F. K. Daily* 576, 26 Jul. 1940 (DA, FC). Summit county: in Portage lake south of Akron, *W. A. & F. K. Daily* 575, 26 Jul. 1940 (DA, FC). KENTUCKY: pond near Walton, Boone county, *B. B. McInteer* 13, 652, 22 Aug. 1929 (DA, FC); *J. B. Lackey*, 10 Oct. 1940 (DA, FC); Blue pond, Fulton county, *McInteer* 545, 13 Aug. 1929 (DA, FC); pond 12 miles east of Hickman, Fulton county, *McInteer* 529, 13 Aug. 1929 (DA, FC); pond 2 miles south of Glasgow, Barren county, *McInteer* 516, 10 Aug. 1929 (DA, FC); in reservoir, Lexington, *Daily*, *McInteer*, & *A. Harvill* 845, 30 Oct. 1940 (DA, FC); pond in fish hatchery, Fort Mitchell, Kenton county, *J. H. Hoskins & Daily* 251, 2 Dec. 1939 (DA, FC); sandpit, Greenwood road near Louisville, *H. Bishop*, 30 Oct. 1931 (DA, FC).

TENNESSEE: Radnor Lake, *H. C. Bold*, 20 Oct. 1936 (FC); Percy Warner lake, Nashville, *Bold* 13, 1933 (FC); pond on M. Hayes farm, Obion county, *H. Silva* 1316, 1317, 1319, 12 Jul. 1949 (FC, TENN). ALABAMA: pond no. 9, Marion Fish Cultural Station, Marion, *J. R. Snow* 7, 9 Jul. 1953 (DA, FC). MICHIGAN: Thayer's lake, Torch lake, and Elk lake, Antrim county, *J. H. Hoskins*, 24 Aug. 1934 (DA, FC); McDonald lake, Yankee Springs, Hastings, Barry county, *G. T. Velasquez* 16, 4 Aug. 1936 (D, TA); French Farm lake, Cheboygan county, *G. W. Prescott* 3M6, Aug. 1941 (FC); Interlochen, Grand Traverse county, *J. H. Hoskins*, 29 Aug. 1934 (DA, FC); Lake Leelanau, Leelanau county, *Hoskins*, 28 Aug. 1934 (DA, FC); Pasinski pond, Genoa township, Livingston county, *W. F. Carbine*, 1938 (FC, TA); Mud lake west of Curtis, Mackinac county, *H. K. Pbinney* 4M41/15-1, 19 Jul. 1941 (FC, PHI); Lake George, Oakland county, *C. E. Taft* 155, Aug. 1936 (DA, FC); Anne Louise lake, Schoolcraft county, *Pbinney* 9M41-16, 19 Jul. 1941 (FC, PHI); Three Lakes, Ann Arbor, *L. N. Johnson* 5, 27 Sept. 1892 (FC, NY).

INDIANA: Bartholomew county: Columbus By-pass pond, Columbus, *F. K. & W. A. Daily* 1581B, 20 Apr. 1947 (DA, FC), *F. K. & W. A. Daily & M. F. Cundiff* 2104, 13 May 1949 (DA, FC). Carroll county: Lake Freeman near Monticello, *Daily* 5, 15, 877, Jul. 1938, 1941 (DA, FC). Decatur county: in Cupp's pond 5 miles east of Greensburg and in limestone pond between Harts-ville and Greensburg, *W. A. & F. K. Daily & C. Kenoyer* 1166, 1168, 19 Sept. 1943 (DA, FC). Elkhart county: Simonton lake 4 miles north of Elkhart, *F. K. & W. A. Daily* 2616, 2618, 26 Aug. 1952 (DA, FC). Fulton county: Nyona (North Mud) lake 4 miles east of Fulton, *F. K. & W. A. Daily* 1476, 1477, 1479, 1480, 29 Jun. 1946 (DA, FC). Kosciusko county: Big Barbee lake 3 miles south of North Webster, *F. K. & W. A. Daily* 2271, 27 Jul. 1950 (DA, FC); Dewart lake, *F. K. & W. A. Daily* 2115, 9 Jul. 1949 (DA, FC); Eagle lake, *H. W. Clark & B. W. Evermann* 255, Aug. 1906 (FC, US); Kuhn lake, Tippecanoe township, *F. K. & W. A. Daily* 2268, 27 Jul. 1950 (DA, FC); Pappakeechee lake south of Lake Wawasee, *F. K. & W. A. Daily* 2273, 28 Jul. 1950 (DA, FC), *B. H. Smith* 145, 15 Sept. 1929 (DA, FC); Ridinger lake, Washington township, *F. K. & W. A. Daily* 2270, 27 Jul. 1950 (DA, FC); Beaver Dam lake 4 miles northwest of Silver Lake, *Daily* 82, 10 Jun. 1939 (DA, FC); Silver lake north of Silver Lake, *F. K. & W. A. Daily* 2168, 2169, 22 Jul. 1950 (DA, FC); Lake Wawasee, *F. K. & W. A. Daily* 2190, 2209, 2232, 2258, 2274, 23—28 Jul. 1950 (DA, FC); Lake Winona, *B. H. Smith* 199, 15 Sept. 1929 (DA, FC), *C. M. Palmer*, 30 Aug. 1935 (D, DA, FC), *Palmer* 168, Summer 1936 (DA, FC). Lake county: Cedar lake at Cedar Lake, *F. K. & W. A. Daily* 2561, 2562, 28 Aug. 1951 (DA, FC); Calumet river north of Miller station, *P. D. Voith & F. Drouet* 2367, 28 Sept. 1938 (FC, NY). Marion county: in Bacon's Bog pond, Indianapolis, *W. A., F. K., J. H., & M. Daily* 861, 862, 27 Jul. 1941 (DA, FC). Marshall county: Lake of the Woods northeast of Plymouth, *Clark & Evermann* 27, 12 Jul. 1909 (FC, US); Lost lake, Culver, *F. K. & W. A. Daily* 1518, 3 Jul. 1946 (DA, FC); in spring by Culver depot, *Clark & Evermann* 272, 27 Sept. 1900 (FC, US); Lake Maxinkuckee, *Clark & Evermann* s. n. and 52, 18 Oct., 15 Nov. 1906 (FC, US). Monroe county: in a limestone sink-hole pond 3 miles south of Bloomington, *F. K. & W. A. Daily* 1004, 7 Sept. 1942 (DA, FC); Wiemer's lake 4 miles northwest of Bloomington, *F. K. & W. A. Daily* 1005, 7 Sept. 1942 (DA, FC). Montgomery county: in lagoon in Shades state park, Waveland, *F. K. & W. A. Daily* 965, 6 Jun. 1942 (DA, FC), *L. Lee*, 17 Jun. 1942 (DA, FC). Morgan county: Brickyard pond adjoining Bethany Park, *F. K. & W. A. Daily* 1031, 20 Sept. 1942 (DA, FC). Porter county: in Wahob lake and in a pond connected with Spectacle lake, north of Valparaiso, *F. K. & W. A. Daily* 2572, 2575, 30 Aug. 1951 (DA, FC). Steuben county: Clear lake 6 miles east of Fremont, *F. K. & W. A. Daily* 1933, 13 Sept. 1947 (DA, FC); Crooked lake at Crooked Lake, *Palmer* B50, 30 Sept. 1933 (DA, FC), *F. K. & W. A. Daily* 2459, 2461, 18 Jun. 1951 (DA, FC); Fox lake southwest of Angola, *F. K. & W. A. Daily* 2487, 19 Jun. 1951 (DA, FC); Lake George 6 miles north of Angola, *F. K. & W. A. Daily* 1934, 13 Sept. 1947 (DA, FC); Green lake west of Fremont, *F. K. & W. A. Daily* 2450, 17 Jun. 1951 (DA, FC); Hamilton lake, Circle park, Hamilton, *F. K. & W. A. Daily* 2443, 2445, 17 Jun. 1951 (DA, FC); Lake James, Pokagon state park, *F. K. & W. A. Daily* 1918, 12 Sept. 1947 (DA, FC); Mill Pond lake at Nevada Mills, *F. K. & W. A. Daily* 1936, 14 Sept. 1947 (DA, FC); Lake Pleasant 4 miles east of Orland, *F. K. & W. A. Daily* 2470, 18 Jun. 1951 (DA, FC); Pleasant lake at Pleasant Lake, *F. K. & W. A. Daily* 2458, 18 Jun. 1951 (DA, FC); Silver lake 4 miles west of Angola, *F. K. & W. A. Daily* 2488, 2490, 19 Jun. 1951 (DA, FC). Vigo county: *B. H. Smith* 647, 4 Aug. 1930 (DA, FC); St. Mary's lake, *Smith*

393, 13 Aug. 1930 (DA, FC). Wells county: in Kunkel lake 2 miles east of Bluffton, F. K. & W. A. Daily 2433, 16 Jun. 1951 (DA, FC).

WISCONSIN: Pleasant lake near Lauderdale lakes, G. W. Prescott 3W28, Aug. 1938 (FC); Razorback lake, E. J. Kryski 49, 26 Jul. 1938 (DA, FC). Burnett county: Fish lake, G. M. Smith 64 (FC). Dane county: laboratory cultures, R. Evans, G. Fitzgerald, 8 Jun., 25 Oct. 1949 (FC); Fourth lake, Madison, W. Trelease, 1882 (MO); Lake Mendota, Madison, Trelease, 1882 (FC, D, FH, MO), R. E. Blount, 2 Oct. 1886 (FC). Kenosha county: Silver lake in Silver Lake, E. H. Ablstrom, 5 Jun. 1932 (DA, FC). Polk county: North Twin lake, G. M. Smith 61, 22 Aug. 1917 (FC). Rock county: in small lake near Clear lake, J. B. Lackey, Aug. 1943 (FC). Vilas county: Alequash lake, Prescott W155, 2W268, 13 Aug. 1936, 11 Jul. 1937 (FC); High lake, Prescott 2W59, 22 Jun. 1937 (FC). Washburn county: Spooner lake, W. Trelease (MO). Waushara county: pond east of Wild Rose near Silver lake, Prescott 2W330, 19 Jul. 1937 (FC). ILLINOIS: Lake county: Diamond lake, Fox lake, Lake Marie, Petit lake, Pistakee lake, Slocum lake, and Lake Zurich, E. H. Ablstrom, 5 Jun. 1932 (DA, FC); Grass lake and Slocum lake, M. E. Britton 924, 926, 24-25 Aug. 1939 (DA, FC). MINNESOTA: Fountain and Iowa lakes (western prairie lakes), C. B. Reif, 28 Jun. 1936, 26 Aug. 1938 (DA, FC). Anoka county: Rice lake, S. Eddy, 16 Aug. 1932 (DA, FC). Cass county: Cass lake, S. Eddy, 10 Sept. 1936 (DA, FC). Clearwater county: Lake Itasca and De Soto lake, Eddy, 29 Aug. 1935, 20 Aug. 1940 (DA, FC). Hennepin county: Bass pond, Eddy, 22 Sept. 1931 (DA, FC); Cedar lake, Eddy, 14 Aug. 1931 (DA, FC); Cross lake just north of Minneapolis, Reif, 22 Sept. 1936 (DA, FC); Long lake, B. T. Shaver & J. E. Tilden, 5 Sept. 1895 (as *Clathrocystis aeruginosa* in Tild., Amer. Alg. no. 194A, B, FC, MIN, NY, US); Lake of the Isles, Minneapolis, K. Damann, 18 Aug. 1936 (FC), F. Drouet 5594, 19 Aug. 1944 (FC); Lake Minnetonka at Spring Park, Drouet & A. A. & E. Cohen 5007, 5016, 8 Aug. 1943 (FC); Lake Nokomis, Eddy, 14 Aug. 1931 (DA, FC). Itasca county: Bowstring lake, Reif, 29 Jul. 1936 (DA, FC). Jackson county: Heron lake, Reif, 11 Jul. 1938 (DA, FC). Kandiyohi county: Kandiyohi lake, Reif, 7 Sept. 1938 (DA, FC). Ottertail county: Crystal, Little Pelican, Sand, Sauer, Sear, Spirit, and Wimer lakes, Eddy, Jul.—Aug. 1940 (DA, FC); Ottertail lake, Reif, 13 Sept. 1938 (DA, FC). Ramsey county: in lake, Como park, St. Paul, J. E. Tilden, 10 Aug. 1895 (as *Clathrocystis aeruginosa* in Tild., Amer. Alg. no. 194B, B, FC, MIN, NY, US); Lake Josephine, Eddy, 18 Jul. 1931 (DA, FC); in Keller lake north of St. Paul, Drouet & E. Cohen 5045, 5050, 9 Aug. 1943 (FC); McCarron's pond, Reif, 15 Aug. 1931 (DA, FC); Lake Owasso, Eddy, 15 Aug. 1931 (DA, FC); Round lake, Reif, 13 Jul. 1938 (DA, FC).

IOWA: Center lake, G. W. Prescott 317, 10 Jul. 1925 (D, NY); Des Moines river, Boone county, W. C. Starrett P34, P38, P47, P165, 18 & 29 Jul. 1946, 9 Aug. 1947 (FC); Lake Okoboji, M. S. Markle, Summer 1926 (DA, FC), Prescott 316, 338, 30 Jun. 1925, 24 Jun. 1926 (D), Prescott, 23 Aug. 1930 (FC). MISSOURI: in lake, Pertle Springs, Warrensburg, Drouet 778, 26 Oct. 1930 (D); St. Louis, G. T. Moore, Aug. 1913 (D); Agriculture pond, Columbia, Drouet 990, 27 Jul. 1932 (D); laboratory culture (no. 1036 from Dr. Gerloff), University of Missouri, Columbia, V. W. Proctor, 31 Oct. 1952 (FC). ARKANSAS: Monticello, Drew county, D. Demaree 24557, 16 Jul. 1943 (FC); lake in Malvern, Hot Spring county, N. E. Gray 284, 9 Sept. 1939 (FC); artificial lake east of 1000 Drippings, Garland county, Gray 659, 3 Sept. 1940 (FC); Lake Hamilton, Garland county, Gray 134-35, 18 Aug. 1939 (FC). LOUISIANA: pond in pasture 1 mile northwest of Baton Rouge, G. W. Prescott La17, 20 Jun. 1938 (D). SASKATCHEWAN: lake near Prince Albert, F. Rissing-Moore & O. H. Stiffs Bracerette, 2 Aug. 1951 (FC). NORTH DAKOTA: Devils Lake, M. A. Brannon 1, Aug. 1913 (FC, UC). NEBRASKA: Arthur county: Haythorn lake, W. Kiener 15457—15460, 10 Sept. 1943 (FC, KI). Dawson county: Johnson lake south of Lexington, Kiener 24671, 24672a, 7 Jul. 1949 (FC, KI). Dodge county: sandpit lakes, Fremont, Kiener 19700, 23934, 15 Sept. 1945, 1 Jul. 1948 (FC, KI). Garden county: Crescent lake, Oshkosh, Kiener 16183, 16190, 4 Nov. 1943 (FC, KI). Cherry county: Hackberry, Dewey and Watts lakes, E. R. Walker & E. N. Anderson, Jul. 1912 (NEB); Hackberry lake, E. Palmatier, Jul. 1936 (NEB). Hall county: sandpit pond, Grand Island, Kiener 15176, 15177, 29 Aug. 1943 (FC, KI); gravel-pit pond southeast of Grand Island, Kiener 17176, 17 Aug. 1944 (FC, KI). Hitchcock county: lake 3 miles east of Stratton, Kiener 10470, 10477, 24 Jul. 1941 (FC, KI). Holt county: shore of Goose lake 25 miles south of O'Neill, Kiener 21390, 8 Aug. 1946 (FC, KI). Kimball county: Bennett reservoir east of Kimball, Kiener 22706, 18 Aug. 1947 (FC, KI). Lancaster county: Du Teau farm pond, Lincoln, Kiener 21431, 21 Aug. 1946 (FC, KI). Lincoln county: Sutherland reservoir, Sutherland, Kiener 24693, 24695, 11 Jul. 1949 (FC, KI); fish-hatchery ponds south of North Platte, Kiener 17261, 22 Aug. 1944 (FC, KI); Lake Maloney, North Platte, Kiener 24685, 24687, 24689—24691, 10 Jul. 1949 (FC, KI), Kiener 24029, 24031, 28 Jul. 1949 (FC, KI).

KANSAS: stagnant pond, Pittsburg, R. Patrick, 5 Sept. 1938 (FC). TEXAS: sewage disposal lakes at Camp Barkeley, Taylor county, W. L. Tolstead 7750, 29 Jan. 1944 (FC). COLORADO: Barr lake, Adams county, R. Prettyman, 30 Jul. 1939 (DA, FC). UTAH: Strawberry reservoir, Wasatch county, Utah Party F19, 17 Mar. 1934 (FC), A. S. Hazzard F16, 24 Aug. 1933 (FC).

ARIZONA: station 13, Mary's lake, Flagstaff, H. S. Colton, 28 Aug. 1923 (Type of *Microcystis aeruginosa* f. *occidentalis* W. R. Taylor, TA). BRITISH COLUMBIA: Deer lake, Burnaby, New Westminster county, J. E. Nielsen 84, 87, 7 Sept. 1924, 24 May 1925 (FC). WASHINGTON: Green lake, Seattle, N. L. Gardner, Dec. 1903 (as *Clathrocystis aeruginosa* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1153, FC, L, MICH, MIN, NEB, NY, TA, US); lake on Fidalgo island, L. E. Griffin, Summer 1938 (FC). CALIFORNIA: in Clear lake, 3 miles north of Lower Lake, Lake county, Gardner 7996, 25 Oct. 1936 (FC, UC); in Puddingstone lake near La Verne, Los Angeles county, G. J. Hollenberg 1527, 1646, 30 Sept. 1924, 13 Sept. 1936 (FC, UC); Sweetwater dam, San Diego county, B. Bostwick 72 (FC, UC); Laguna Puerca, San Francisco, K. Brandegee, Mar. 1913 (UC). MEXICO: in Lake Chapultepec, Mexico City, R. Patrick 148, 19 Jul. 1947 (FC, PH). GUATEMALA: Lake Amatitlan, W. A. Kellerman 5034, Jan. 1906 (FC), S. E. Meek 1 (Type of *Clathrocystis robusta* Clark, FC [Fig. 11]), 9, 11, 12, 16, 21—23, 25, 26, 40, Jan., Feb. 1906 (FC); La Laguna one mile north of Jalapa, J. A. Steyermark 32246, 30 Nov. 1939 (FC); Lago Atescatempa south of Asunción Mita, dept. Jutiapa, Steyermark 31841, 17 Nov. 1939 (FC). COSTA RICA: Laguna del Misterio, al norte de San José, J. M. Orozco C. 35—37, 48—50, 52, 1935 (FC). PANAMA: Barro Colorado island, Canal Zone, A. M. Chikering, 5 Jul., 4 Aug. 1936 (D, FH, L, NY, S). BRAZIL: Ceará: Açude São Francisco, São Francisco, S. Wright, 2 Nov. 1937 (D, FH, NY); Açude Cedro near Quixadá, Wright & P. de Azevedo 1539, 31 Aug. 1935 (D, FH, MICH, NY); Lagôa Porangabuçu, Fortaleza, F. Drouet 1504, 3 Dec. 1935 (D, DT, NY). Pará: in small bays in Rio Tapajoz, J. W. H. Trail 165 (Type of *Microcystis caerulea* Dickie, BM). Paraíba: Açudes Baixo de Pão, Lapa, Puxinana, Simão, and Velho, Campina Grande, Wright 1558, 1559, 1561, 1565, 1567, 1568, 1572—1574, 1578, 1587, 1589, 1592, 1606, 1608, 1967, 1985, 1992, 1998—2000, 2004, 2017, 2019, 2041 (D), 4258 (DA, FC), 1933—35; Açude Esperança near Esperança, Wright 1595, 1974, 2043, 12 Dec. 1933, 19 Sept. 1934 (D); Açude Linda Flôr near Mojeiro de Baixo, Wright 1562, 24 Nov. 1934 (D, MICH, NY); açude near Serra Branca, Wright 1995, 6 Apr. 1934 (D). Rio Grande do Sul: Lagôa dos Quadros, H. Kleerekoper, Oct. 1941 (FC). ARGENTINA: Laguna Los Chilenos near Dufaur, Laguna Chascomus, and Laguna Blanca Grande, prov. Buenos Aires, S. Wright 2098, 2101, 2113, Nov. 1936, Jan. 1937 (D); Lagunas Garcia, Tala, and La China, prov. San Luis, Wright 2096, 2111, 2112, Dec. 1936 (D). PERU: Cocha Zapote, Rio Pacaya, Bajo Ucayali, dept. Loreto, F. Anceita, July, 1947 (FC). FORMOSA: fish pond, Tainan, C. C. Chou, 11 May 1951 (D). PHILIPPINES: Pasig river, Manila, W. R. Shaw 347, Mar. 1909 (B, L, NY, US), E. Quisumbing 9, 1929 (TA); Laguna Bay, Laguna, R. Medina & G. T. Velasquez 375, 15 Jan. 1940 (FC, S). CHINA: Woo-Sung, Chekiang, J. E. Nielsen 63, 29 Jul. 1923 (FC); Tientsin, M. S. Clemens 6014, 22 Jul. 1913 (FC, UC); Tali lake, Yunnan, S. C. Hsiao, Nov. 1945—Feb. 1946 (FC). AUSTRALIA: Somerset dam, Queensland, A. B. Cribb, Jul. 1947 (FC). BURMA: Prome {S. Kurz} (Type of *Chroococcus indicus* Zell., L [Fig. 8]); Rangoon, L. P. Khanna 576, 589, Spring 1936 (FC); Cantonment Gardens, Rangoon, Khanna 332, 334, 9 May 1935 (FC). CAMBODIA: im Bien-ho [Toulé-Sap], O. Kuntze, 1875 (NY). INDIA: in einem Bassin der Victoria-Garden, A. Hansgirg, Nov. 1895 (in Hauck & Richt., Phyk. Univ. no. 748B, L, MIN, NY); Bombay, in horto Victoria Garden, Hansgirg, Sept. (Type of *Polycystis insignis* Beck in Mus. Vindob. Krypt. Exs. no. 227, W; isotypes, DT, FC [Fig. 10], L, NY). CEYLON: Perithpan-pokuna near Isurumunija temple at Anuradhapoora, P. E. Fritsch, 3 Oct. 1903 (Type of *Microcystis protocystis* Crow in the collection of F. E. Fritsch; isotype D [Fig. 5]); Colombo, P. J. Philson & I. B. Warnock, Sept. 1934 (as *M. aeruginosa* in Tild., So. Pacific Pl., 2nd Ser., no 3, FC).

2. ANACYSTIS INCERTA Drouet & Daily, Butler Univ. Bot. Stud. 10: 221. 1952. *Polycystis incerta* Lemmermann, Forschungsber. Biol. Sta. Plön 7: 132. 1899. *Microcystis incerta* Lemmermann, Krypt.-Fl. Mark Brandenburg. 3: 76. 1907; Forti, Syll. Myxophyc., p. 86. 1907. *M. pulvereae* var. *incerta* Crow, New Phytol. 22: 66. 1923. *M. pulvereae* f. *incerta* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938. *Diplocystis incerta* Drouet & Daily, Lloydia 11: 78. 1948. —Specimen from Lake Wombsjön, Sweden, determined by the author, designated here as the Type (S).

Polycystis elongata W. & G. S. West, Trans. Roy. Irish Acad. 32(B): 79. 1902. *Clathrocystis elongata* Forti, Syll. Myxophyc., p. 96. 1907. —Type from Lough Neagh, Ireland (BIRM).

Clathrocystis bolsatica Lemmermann, Forschungsber. Biol. Sta. Plön 10: 150. 1903. *Microcystis bolsatica* Lemmermann, Krypt.-Fl. Mark Brandenburg. 3: 77. 1907. *M. pulvereae* f. *bolsatica* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938. —Specimen from Neudamm, Germany, determined by the author, designated here as the Type (B).

Microcystis minutissima West, Proc. Roy. Irish Acad. 31: 41. 1912. *Aphanoshece saxicola* f.

minutissima Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 151. 1938. —Type from Achill island, Ireland (BIRM).

Aphanocapsa elachista var. *conferta* W. & G. S. West, Journ. Linn. Soc. Bot. 40: 432. 1912. *Microcystis pulvere* f. *conferta* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938. —Type from Perthshire, Scotland (BIRM).

Microcystis pallida Migula, Crypt. Germ., Austr. & Helvet. Exs. 52(Alg.): 264. 1931. *M. Migulae* J. de Toni, Archivio Bot. 15: 291. 1939. —Isotypes from Eisenach, Germany (B, FC, FH, NY, S, TA). FIG. 13.

Aphanocapsa minima Migula, Crypt. Germ., Austr. & Helvet. Exs. 58(Alg.): 277. 1933. —Isotype from Marksuhl, Germany (FC, FH, NY, S, TA). FIG. 14.

Aphanothece clathrata var. *rosea* Skuja, Symbolae Bot. Upsal. 9(3): 36. 1948. —Paratype received from the author from Gr. Plöner See, Germany (D). FIG. 12.

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Polycystis (*Clathrocystis*) *reticulata* Lemmermann, Bot. Centralbl. 76: 153. 1898. *Coelosphaerium reticulatum* Lemmermann, Krypt. Fl. Mark Brandenb. 3: 84. 1907. *Cyanodictyon reticulatum* Geitler in Pascher, Süßwasserfl. 12: 103. 1925. *Sphaerodictyon reticulatum* Geitler, Beih. z. Bot. Centralbl., II, 41: 231. 1925.

Coelosphaerium natans Lemmermann, Ber. Deutsch. Bot. Ges. 18: 309. 1900.

Microcystis incerta var. *elegans* Lemmermann, Forschungsber. Biol. Sta. Plön 10: 150. 1903.

Aphanocapsa delicatissima W. & G. S. West, Journ. Linn. Soc. Bot. 40: 431. 1912. *Microcystis pulvere* f. *delicatissima* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938. —The original sketches and notes are reproduced here from the West notes in the British Museum (Natural History): FIG. 15.

Microcystis pulvere f. *elongata* Crow, New Phytol. 22: 66. 1923.

Microcystis natans Lemmermann ex Skuja, Acta Horti Bot. Univ. Larv. 7: 45. 1934.

Plantae smaragdinae vel laete aerugineae, microscopicae, sphaericae, ovoideae, vel cylindricae, varie et irregulariter lobatae vel clathratae, saepe conferte confluentes, cellulis in divisione binis depresso—sub-sphaericis, aetate provecta globosis diametro 0.5—2 μ crassis, sine ordine per gelatinum vaginale distributis; gelatino vaginale hyalino, homoganeo, diffuente; protoplasmate dilute aerugineo, pseudovacuolas continente. FIGS. 12—15.

Developing sparsely in freshwater plankton, seldom the dominant species, and rarely forming conspicuous water blooms. One of the smallest of the Myxophyceae, this species may often be mistaken for coccoid bacteria. Its morphology, life-history, and synonymy have been discussed by Drouet & Daily in Field Mus. Bot. Ser. 20: 67—83 (1939).

Specimens examined:

SWEDEN: in lacu Wombsjön Scaniae, O. Nordstedt, Jun. 1901 (designated as Type of *Polycystis incerta* Lemm., S; isotypes, B, NY, UC); duck pond, Lovestad, B. Carlén-Nilsson, 15 Jul. 1934 (FC). POLAND: auf dem feuchten Schlamm ausgetrockneter Lachen auf dem Galgenberge, Hülse, 1862 (as *Palmella hyalina* in Rabenh. Alg. no. 1525, FC, L, UC). GERMANY: Gr. Plöner See, W. Rohde, 15 Sept. 1950 (paratype—from the author—of *Aphanothece clathrata* var. *rosea* Skuja, D [Fig. 12]); Teich bei Fürstenfelde bei Neudamm, Izigsohn & de Bary, Sept. 1852 (designated as Type of *Clathrocystis holsatica* Lemm., B); Salzunger See, A. Röse (as *Microhaloa firma* in Rabenh. Alg. no. 453, NY); Marksuhl (Thüringen), in einem kleinen Teich, W. Migula, Sept. 1927 (isotypes of *Aphanocapsa minima* Mig., in Mig., Crypt. Germ., Austr., & Helv. Exs. Alg. no. 277, FC [Fig. 14], FH, NY, TA, S); Eisenach, im Plankton des Prinzensteiches, Migula, 24 Aug. 1931 (FH, S; isotypes of *Microcystis pallida* Mig. in Mig., Crypt. Germ. Austr., & Helv. Exs. Alg. no. 264, B, FC [Fig. 13], FH, NY, S, TA); Altenburger See, Thüringen, Migula, Sept. 1927 (as *Aphanothece nidulans* in Mig., Krypt. Germ., Austr., & Helv. Exs. Alg. no. 228, TA). CZECHOSLOVAKIA: Starý Hospidár near Trebon, B. Fott, 10 Jun. 1946 (FC). BRITISH ISLES: Loch Katrine, Perthshire, Scotland, W. & G. S. West, Mar. 1909 (Type of *Aphanocapsa elachista* var. *conferta* W. & G. S. West, BIRM); plankton, Lough Straheen, Achill island, county Mayo, Ireland, 11 June (Type of *Microcystis minutissima* West, BIRM); Lough Neagh, North Ireland, W. West, May 1900 (Type of *Polycystis elongata* W. & G. S. West, BIRM; isotypes, FC, UC). UNION OF SOUTH AFRICA: tow-netting in channel, Barberspan, southwest Transvaal, Mrs. G. E. Hutchinson 4, 6 Apr. 1928 (D).

OHIO: Wehrle's pond on Middle Bass island, Smith's pond on North Bass island, and East Harbor near Catawba island, Ottawa county, E. H. Ahlstrom, June, Jul. 1931—32 (DA, FC); in pond of fish hatchery, Newtown, Hamilton county, F. Brinley, 29 Oct. 1941 (DA, FC). KENTUCKY: reservoir of Walton, J. B. Lackey, Summer 1940 (FC). INDIANA: pond on Wisniewski farm east of Cook, Lake county, F. K. & W. A. Daily 2565, 29 Aug. 1951 (DA, FC). WISCONSIN: laboratory culture, University of Wisconsin, Madison, R. Evans, 8 Jun. 1949 (FC). ILLINOIS: Goose lake northwest of Quincy, Adams county, T. C. Dorris 59, 6 Sept. 1950 (FC). MINNESOTA: with *Anacystis cyanea*, Heron lake, Jackson county, Minnesota Fish Commission, Jul. 1938 (FC). NEBRASKA: floating in lake, Antioch, Sheridan county, W. Kiener 20613, 23 May 1946 (FC, KI). BRAZIL: with *A. cyanea*, Açude Velho near Campina Grande, Paraíba, S. Wright 1570, Mar. 1935 (D). PERU: Cocha Zapote, Rio Pacaya, Bajo Ucayali, dept. Loreto, F. Anceita, Jul. 1947 (FC).

3. *ANACYSTIS MARINA* Drouet & Daily, Lloydia 11: 77. 1948. *Aphanocapsa marina* Hansgirg in Foslie, Contrib. Knowl. Mar. Alg. Norway 1: 169. 1890. —Type from Pasvig, Norway (W). FIG. 376.

Aphanothece nidulans Richter in Witrock & Nordstedt, Alg. Exs. 14: 694. 1884; Bot. Not. 1884: 128. 1884; Hedwigia 23: 66. 1884. *A. saxicola* f. *nidulans* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 151. 1938. *Coccochloris nidulans* Drouet & Daily, Lloydia 11: 78. 1948. *Anacystis nidulans* Drouet & Daily, Butler Univ. Bot. Stud. 10: 221. 1952. —Type from Anger near Leipzig, Germany (FC).

Microcystis parasitica var. *glacialis* Fritsch, Nat. Antarctic Exped. (1901—04), Nat. Hist. 6 (Freshw. Alg.): 15. 1912. —Type from McMurdo bay, Antarctica (in the collection of F. E. Fritsch).

Aphanocapsa Lewisii Keefe, Rhodora 29: 41. 1927. —Type from Falmouth, Massachusetts (FH). FIG. 377.

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Aphanothece pulverulenta Bachmann, Mitt. Naturf. Ges. Luzern 8: 10. 1921.

Aphanothece Protohydrae Häyrén in Luther, Acta pro Fauna & Flora Fennica 52(3): 24. 1923.

Synechocystis parvula Perfiljev, Bull. Kom. Saproel. Leningrad 1: 61. 1923.

Aphanocapsa salina Woronichin, Bull. Jard. Bot. Princip. U. R. S. S. 28: 30. 1929.

Plantae laete aerugineae, praecipue sphaericae vel ovoideae microscopicae, aut in strata gelatinosa macroscopica evolventes, cellulis in divisione binis depresso—sub-sphaericis, aetate provecta globosis diametro 0.5—2 μ crassis sine ordine (frequenter conferte) per gelatinum vaginale distributis; gelatino vaginale hyalino, homoganeo, (saepe omnino) diffuente; protoplasmate aerugineo, homoganeo. FIGS. 376, 377.

In old pools of standing fresh or brackish water, and among other algae on wet rocks, wood, and soil; often developing in cultures and in old aquaria. Plants of this species sometimes give the impression of having originated as growth-forms of *Anacystis montana* or *Entophysalis* spp. Coccoid bacteria may be easily confused with *Anacystis marina*.

Specimens examined:

NORWAY: [in a rock pool at or a little above high water mark.] Pasvig, M. Foslie, 3 Aug. 1889 (Type of *Aphanocapsa marina* Hansg. in Hauck & Richt., Phyk. Univ. no. 468, W; isotypes, D [Fig. 376], FH, L, NY, UC). GERMANY: ad parietes caldari in Anger prope Lipsiam, P. Richter, 2 Mar. 1882 (Type of *Aphanothece nidulans* Richt. in Wittr. & Nordst., Alg. Exs. no 694, FC; isotypes, D, L, NY). NETHERLANDS: ten Noorden van Harlingen, Friesland, J. T. Koster 746, Aug. 1942 (L). MASSACHUSETTS: Salt pond, Falmouth, A. M. Keefe (Type of *Aphanocapsa Lewisii* Keefe, FH; isotype, D [Fig. 377]); freshwater pools, Angelica point near New Bedford, E. H. Battle, culture from A. W. Frenkel (FC). CONNECTICUT: laboratory culture, New Haven, R. A. Lewin, May 1948 (FC). QUEBEC: in a peat bog, St. Hubert, Chambly county, Bro. Irénée-Marie 469, 30 Oct. 1937 (FC). WISCONSIN: laboratory culture, Madison, R. Evans, 23 May 1949 (FC). ILLINOIS: laboratory culture, Urbana, R. C. Hecker, 29 Dec. 1947 (FC). NEBRASKA: culture from Whitetail creek near Keystone, Keith county, W. Kiener 15621, 16 Jul. 1944 (FC, KI); culture from creek south of Gretna, Sarpy county, Kiener 13683a, 16 July 1944 (FC, KI); culture from floodplain pond southeast of Grand Island, Hall county, Kiener 16396b, 11 July 1944

(FC, KI); culture from roadside ditch 9 miles east of North Platte, Lincoln county, *Kiener* 16870, 13 Jul. 1944 (FC, KI). ANTARCTICA: brick-colored ice 4 feet above frozen watercourse through "Penknife" ice, McMurdo Bay, *National Antarctic Expedition*, 13 Sept. 1902 (Type of *Microcystis parasitica* var. *glacialis* Fritsch in the collection of F. E. Fritsch; isotype, D). PHILIPPINES: on moist wall under leaking pipe, Iloilo Normal School, Iloilo City, *J. D. Soriano* 1559, 4 Jan. 1953 (FC, PUH).

4. ANACYSTIS MONTANA (Lightf.) Dr. & Daily.

Plantae aeruginosae, rubrae, roseae, violaceae, nigrae, vel decoloratae, microscopicae vel macroscopicae, libere natantes vel in strata inveniuntur, cellulis in divisione binis depresso—sub-sphaericis (raro truncato-hemisphaericis), aetate provecta globosis diametro ad 6μ (ad 20μ ubi a fungis parasitatis) crassis, sine ordine aut in seriebus eucapsoideis per gelatinum vaginale distributis; gelatino vaginale homogeneo vel lamelloso, primum hyalino deinde (in f. *montana*) saepe partim vel omnino rubrescente vel coerulescente vel raro lutescente; protoplasmate aerugineo, homogeneo passim granuloso. FIGS. 16—99.

Key to forms of *Anacystis montana*:

Cells 2— 6μ in diameter, larger where parasitized by fungi; gelatinous matrix lamelloso or homogeneous, becoming red, blue, or rarely yellowish-brown in subaerial and aerial situations 4a. f. MONTANA

Cells 2— 3μ in diameter; gelatinous matrix hyaline and homogeneous.. 4b. f. MINOR

Cells 5— 6μ in diameter; gelatinous matrix hyaline and homogeneous 4c. f. GELATINOSA

4a. ANACYSTIS MONTANA f. MONTANA. *A. montana* Drouet & Daily, Butler Univ. Bot. Stud. 10: 221. 1952. *Ulva montana* Lightfoot, Fl. Scot. 2: 973. 1777. *Palmella alpicola* Lyngbye, Tent. Hydrophyt. Dan., p. 206. 1819. *Conferva alpina* Lyngbye pro synonym., loc. cit. 1819. *Merrettia alpicola* S. F. Gray, Nat. Arr. Brit. Pl., p. 349. 1821. *Palmella montana* Agardh, Syst. Algar., p. 15. 1824. *Coccochloris alpicola* Sprengel, Linn. Syst. Vegetab., ed. 16, 4(1): 373. 1827. *Phytoconis alpicola* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 53. 1843. *Sorospora montana* Hassall, Hist. Brit. Freshw. Alg. 1: 309. 1845. *Bichatia montana* Trevisan, Sagg. Monogr. Alg. Coccot., p. 60. 1848. *Chaos alpicola* Bory pro synonym. ex Trevisan, loc. cit. 1848. *Bichatia alpicola* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Gloeocapsa alpicola* Bornet in Wittrock, Nordstedt & Lagerheim, Alg. Exs. 32: 1540. 1903; Bot. Not. 1903: 140. 1903. *Gloeocapsa montana* Wille, Nyt Mag. Naturvid. 56(1): 45. 1918. —Type from Isle of Skye, Scotland (K).

Palmella sanguinea Agardh, Syst. Algar., p. 15. 1824. *Haematococcus sanguineus* Agardh, Icon. Algar. Eur., no. 24. 1828—35. *Microcystis sanguinea* Kützinger, Linnaea 8: 372. 1833. *Palmella cryptophylla* Carmichael pro synonym. in Hooker, Engl. Fl. 5(1): 395. 1833; Hooker, Brit. Fl. 2: 395. 1833. *Protococcus sanguineus* Brébisson & Godey, Mém. Soc. Acad. Sci., Arts & Belles-Lettres Falaise 1835: 40. 1836. *Gloeocapsa sanguinea* Kützinger, Phyc. Gener., p. 175. 1843. *Bichatia sanguinea* Trevisan, Nomencl. Algar. 1: 62. 1845. *Ephebe pubescens* δ *versicolor* Flotow, Bot. Zeit. 8: 76. 1850. —Type from near Stockholm, Sweden (LD). FIG. 80.

Haematococcus frustulosus Harvey in Hooker, Engl. Fl. 5(1): 395. 1833; in Hooker, Brit. Fl. 2: 395. 1833. *Palmella frustulosa* Carmichael pro synonym. in Hooker, loc. cit. 1833. *Bichatia frustulosa* Trevisan, Nomencl. Algar. 1: 60. 1845. *Chlorococcum frustulosum* Rabenhorst, Fl. Eur. Algar. 3: 59. 1868. *Gloeocystis frustulosa* W. & G. S. West, Trans. Yorks. Nat. Union 4: 133. 1901. —Type from Scotland (K). FIG. 38.

Palmella livida Carmichael in Hooker, Engl. Fl. 5(1): 397. 1833; in Hooker, Brit. Fl. 2: 397. 1833. *Microcystis livida* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 47. 1843. *Phytoconis livida* Brébisson pro synonym. in Meneghini, loc. cit. 1843. *Haematococcus lividus*

- Hassall, Hist. Brit. Freshw. Alg. 1: 332. 1845. *Bichatia livida* Trevisan, Nomencl. Algar. 1: 61. 1845. *Phytoconis sordida* Brébisson *pro synonym*. in Trevisan, Sagg. Monogr. Alg. Coccot., p. 65. 1848. —Type from Scotland (K). FIG. 65.
- Protococcus magma* Brébisson in Brébisson & Godey, Mém. Soc. Acad. Sci., Arts & Belles-Lettres Falaise 1835: 40. 1836. *Pleurococcus magma* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 10, 43. 1843. *Gloeocapsa magma* Kützing, Tab. Phyc. 1: 17. 1846. —Type from Falaise, France (L).
- Anacystis marginata* Meneghini, Consp. Algal. Eugan., p. 324. 1837. *Palmella marginata* Kützing, Phyc. Gener., p. 172. 1843. *Microcystis marginata* Kützing, Tab. Phyc. 1: 6. 1846. *Polycystis marginata* Richter ex Hansgirg, Prodr. Algenfl. Böhmen 2: 145. 1892. *Microcystis aeruginosa f. marginata* Elenkin, Monogr. Algal. Cyanophyc., Pars Spec. 1: 106. 1938. —Type from the Euganean springs, Italy (L). FIG. 19.
- Pleurococcus communis* Meneghini, Consp. Algal. Eugan., p. 338. 1837. —Type from Padua, Italy (FI). FIG. 83.
- Palmella Ralfsii* Harvey, Man. Brit. Alg., p. 179. 1841. *Sorospora Ralfsii* Hassall, Hist. Brit. Freshw. Alg. 1: 310. 1845. *Gloeocapsa Ralfsiana* Kützing, Tab. Phyc. 1: 18. 1846. *Bichatia Ralfsii* Trevisan, Sagg. Monogr. Alg. Coccot., p. 59. 1848. *Gloeocapsa Ralfsii* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 65. 1907. —Type from Dolgelly, Wales (BM).
- Coccolchloris muscicola* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 60. 1843. *Palmella muscicola* Kützing, Phyc. Germ., p. 149. 1845. *P. botryoides* var. *muscicola* Hansgirg, Prodr. Algenfl. Böhmen 1: 138. 1886. *Aphanocapsa muscicola* Wille, Nyt Mag. Naturvid. 56(1): 43. 1918. *Microcystis muscicola* Elenkin, Monogr. Algal. Cyanophyc., Pars Spec. 1: 132. 1938. —Type from the Euganean springs, Italy (FI). FIG. 79.
- Coccolchloris parietina* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 61. 1843. —Type from the Euganean mountains, Italy (FI). FIG. 77.
- Microcystis nigra* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 75. 1843. *Bichatia nigra* Trevisan, Nomencl. Algar. 1: 61. 1845. *Gloeocapsa nigra* Grunow in Rabenhorst, Fl. Eur. Algar. 2: 36. 1865. —Type from the Euganean mountains, Italy (FI). FIG. 64.
- Protococcus fusco-ater* Kützing, Phyc. Gener., p. 168. 1843. *Chroococcus fusco-ater* Rabenhorst, Fl. Eur. Algar. 2: 34. 1865. —Type from Nordhausen, Germany (L). FIG. 46.
- Palmella didyma* Kützing, Phyc. Gener., p. 172. 1843. *Gloeocapsa didyma* Kützing, Tab. Phyc. 1: 14. 1846. *Bichatia didyma* Trevisan, Sagg. Monogr. Alg. Coccot., p. 62. 1848. —Type from Padua, Italy (L).
- Gloeocapsa aeruginosa* Kützing, Phyc. Gener., p. 174. 1843. *G. aeruginosa* Kützing, Phyc. Germ., p. 151. 1845. *Bichatia aeruginosa* Trevisan, Nomencl. Algar. 1: 59. 1845. —Type from Nordhausen, Germany (L). FIG. 90.
- Gloeocapsa atrata* Kützing, Phyc. Gener., p. 174. 1843. *Ephebe pubescens* δ *atra* Flotow, Bot. Zeit. 8: 76. 1850. —Type from Berne, Switzerland (L).
- Gloeocapsa sanguinolenta* Kützing, Phyc. Gener., p. 174. 1843. *Bichatia sanguinolenta* Trevisan, Nomencl. Algar. 1: 62. 1845. —Type from Sachswerfen, Thuringia, Germany (L). FIG. 61.
- Gloeocapsa coracina* Kützing, Phyc. Gener., p. 174. 1843. *Palmella placentaris* Wallroth *pro synonym*. in Kützing, loc. cit. 1843. *Bichatia coracina* Trevisan, Nomencl. Algar. 1: 60. 1845. *Gloeocapsa coracina* β *placentaris* Kützing, Spec. Algar., p. 219. 1849. *G. coracina* var. *placentaris* Kützing ex Forti, Syll. Myxophyc., p. 56. 1907. —Type from Steigerthal, Thuringia, Germany (L).
- Gloeocapsa rosea* Kützing, Phyc. Gener., p. 174. 1843. *Bichatia rosea* Trevisan, Nomencl. Algar. 1: 62. 1845. —Type from Trieste (L).
- Gloeocapsa Shuttleworthiana* Kützing, Phyc. Gener., p. 175. 1843. *Bichatia Shuttleworthiana* Trevisan, Nomencl. Algar. 1: 62. 1845. —Type from M. Ben Gower, Ireland (L). FIG. 37.
- Gloeocapsa rubicunda* Kützing, Phyc. Gener., p. 175. 1843. *Bichatia rubicunda* Trevisan, Nomencl. Algar. 1: 62. 1845. —Type from Scandinavia (L).
- Protococcus pygmaeus* Kützing, Phyc. Germ., p. 144. 1845. —Type from Battaglia, Italy (L). FIG. 27.
- Haematococcus binalis* Hassall, Hist. Brit. Freshw. Alg. 1: 331. 1845. *Pleurococcus binalis* Trevisan, Sagg. Monogr. Alg. Coccot., p. 32. 1848. —Specimen from Erigal, county Donegal, Ireland, named by the author, designated here as the Type (BM).
- Haematococcus aeruginosus* Hassall, Hist. Brit. Freshw. Alg. 1: 333. 1845. *Palmella aeruginosa* Carmichael *pro synonym*. in Hassall, loc. cit. 1845. *Bichatia Carmichaelii* Trevisan, Sagg. Monogr. Alg. Coccot., p. 65. 1848. —Type from Scotland (K). FIG. 84.
- Gloeocapsa conglomerata* Kützing, Tab. Phyc. 1: 16. 1846. *Bichatia conglomerata* Trevisan, Sagg. Monogr. Alg. Coccot., p. 64. 1848. *Gloeocapsa glomerata* Kützing ex Roumeguère, Alg. des Eaux Douces France, no. 1016. —Type from the Harz mountains, Germany (L). FIG. 81.
- Gloeocapsa cryptococcoides* Kützing, Tab. Phyc. 1: 16. 1846. *Bichatia cryptococcoides* Trevisan, Sagg. Monogr. Alg. Coccot., p. 64. 1848. *Gloeocapsa gelatinosa f. cryptococcoides*

Rabenhorst, Fl. Eur. Algar. 2: 39. 1865. *G. gelatinosa* var. *cryptococcoides* Kützing ex Bizzozero, Fl. Veneta Critog. 2: 63. 1885. —Type from Abano, Italy (L).

Protococcus haematodes Kützing, Tab. Phyc. 1: 5. 1846. *Gloeocapsa haematodes* Kützing, Sp. Algar., p. 222. 1849. *Bichatia haematodes* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Domfront, Orne, France (L). FIG. 88.

Gloeocapsa rupestris Kützing, Tab. Phyc. 1: 17. 1846. *Bichatia rupestris* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Bichatia fuscescens* Lagerheim, Ber. Deutsch. Bot. Ges. 10: 526. 1892. *Gloeocapsa fuscescens* Lagerheim ex Forti, Syll. Myxophyc., p. 58. 1907. —Type from Calvados, France (L). Kützing's note, "an Felsen im Harze" with the original description is surely in error, since only de Brébisson's specimens are labeled thus in the Kützing herbarium.

Gloeocapsa compacta Kützing, Tab. Phyc. 1: 24. 1846. *Rhodocapsa violacea* β *compacta* Richter in Hansgirg, Österr. Bot. Zeitschr. 34: 315. 1884. *Bichatia compacta* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Gloeocapsa violacea* β *compacta* Richter in Hansgirg, Prodr. Algenfl. Böhmen 2: 149. 1892. *G. violacea* var. *compacta* Richter ex Forti, Syll. Myxophyc., p. 40. 1907. —Type from Vire, France (L). FIG. 49.

Gloeocapsa violacea Kützing, Tab. Phyc. 1: 25. 1846. *G. lignicola* Rabenhorst, Fl. Eur. Algar. 2: 41. 1865. *Rhodocapsa violacea* Hansgirg, Österr. Bot. Zeitschr. 34: 315. 1884. *Bichatia lignicola* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Gloeocapsa alpina* f. *lignicola* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 189. 1938. —Type from Paris, France (L). FIG. 42.

Palmella brunnea A. Braun in Kützing, Sp. Algar., p. 212. 1849. *Aphanocapsa brunnea* Nägeli, Gatt. Einzell. Alg., p. 52. 1849. *Anacystis brunnea* Wolle, Fresh-w. Alg. U. S., p. 329. 1887. —Type from Freiburg, Baden, Germany (L). FIG. 87.

Gloeocapsa geminata Kützing, Sp. Algar., p. 219. 1849. *Oocystis geminata* Nägeli pro synonym. in Kützing, loc. cit. 1849. *Oocystis minor* (*micrococca*) Itzigsohn pro synonym. in Rabenhorst, Fl. Eur. Algar. 3: 53. 1868. *Bichatia geminata* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Zürich, Switzerland (L). FIG. 33.

Gloeocapsa scopulorum Nägeli in Kützing, Sp. Algar., p. 220. 1849; Nägeli, Gatt. Einzell. Alg., p. 51. 1849. *Bichatia scopulorum* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Microcystis scopulorum* Nägeli ex Wille, Nyt Mag. Naturvid. 62: 198. 1925. —Type from Schaffhausen, Switzerland (L). FIG. 16.

Gloeocapsa ianthina Nägeli in Kützing, Sp. Algar., p. 220. 1849. *Bichatia ianthina* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Zürich, Switzerland (L). FIG. 23.

Gloeocapsa versicolor Nägeli in Kützing, Sp. Algar., p. 220. 1849. *Bichatia versicolor* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Zürich, Switzerland (L). FIG. 50.

Gloeocapsa ambigua Nägeli in Kützing, Sp. Algar., p. 220. 1849; Nägeli, Gatt. Einzell. Alg., p. 50. 1849. *G. ambigua* a. *fuscolutea* Nägeli, loc. cit. 1849. *G. fuscolutea* Kirchner, Krypt.-Fl. Schlesien 2(1): 260. 1878. *Bichatia ambigua* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *B. fuscolutea* Lagerheim, Ber. Deutsch. Bot. Ges. 10: 526. 1892. *Gloeocapsa ambigua* f. *fuscolutea* Nägeli ex Setchell & Gardner, Univ. Calif. Publ. Bot. 1: 179. 1903. *G. alpina* f. *ambigua* Hollerbach in Elenkin, Monogr. Alg. Cyanophyc., Pars Spec. 1: 189. 1938. —Type from Zürich, Switzerland (L).

Gloeocapsa ambigua β *rivularis* Nägeli in Kützing, Sp. Algar., p. 221. 1849. —Type from Zürich, Switzerland (L).

Gloeocapsa ambigua b. *violacea* Nägeli, Gatt. Einzell. Alg., p. 50. 1849. *G. ambigua* var. *violacea* Nägeli ex Rabenhorst, Alg. Sachs. 61 & 62: 607. 1857. —Type from Zürich, Switzerland (L).

Gloeocapsa ambigua var. *pellucida* Nägeli, Gatt. Einzell. Alg., p. 50. 1849. *G. ambigua* b. *pellucida* Nägeli ex Rabenhorst, Fl. Eur. Algar. 2: 42. 1865. *G. ambigua* f. *pellucida* Nägeli in Roumeguère, Alg. des Eaux Douces France, no. 825. —Type from Zürich, Switzerland (L).

Gloeocapsa opaca Nägeli in Kützing, Sp. Algar., p. 221. 1849; Nägeli, Gatt. Einzell. Alg., p. 50. 1849. *G. magma* b. *opaca* Nägeli in Kirchner, Krypt.-Fl. Schlesien 2(1): 251. 1878. *G. magma* var. *opaca* Kirchner ex Hansgirg, Prodr. Algenfl. Böhmen 2: 147. 1892. *G. magma* f. *opaca* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 176. 1938. —Type from Zürich, Switzerland (L). Nägeli no. 378 as cited by Kützing with the original description is obviously a typographical error.

Gloeocapsa opaca β *pellucida* Kützing, Sp. Algar., p. 221. 1849. *G. opaca* var. *pellucida* Nägeli, Gatt. Einzell. Alg., p. 50. 1849. *G. magma* b. *pellucida* Nägeli in Rabenhorst, Fl. Eur. Algar. 2: 43. 1865. *G. pellucida* Brébisson and *Protococcus pellucidus* Nägeli pro synonym. in Roumeguère, Alg. des Eaux Douces France no. 410. *G. magma* var. *pellucida* Nägeli ex Hansgirg, Prodr. Algenfl. Böhmen 2: 147. 1892. —Type from Zürich, Switzerland (L).

Gloeocapsa punctata Nägeli in Kützing, Sp. Algar., p. 222. 1849; Nägeli, Gatt. Einzell. Alg., p. 51. 1849. *Bichatia punctata* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Coolosphaerium Kuetzingianum* var. *punctatum* Playfair, Proc. Linn. Soc. New South Wales 39: 135. 1914. *C. punctatum* Playfair, Census New South Wales Pl. Suppl. 1: 260. 1917. —Type from Zürich, Switzerland (L).

Ephebe pubescens d. *cruenta* Flotow, Bot. Zeit. 8: 75. 1850. —Type from the Riesengebirge, Bohemia (S).

Monocapsa stegophila Itzigsohn in Rabenhorst, Alg. Sachs. 27 & 28: 263. 1853. *Gloeocapsa stegophila* Rabenhorst, Krypt.-Fl. Sachsen 1: 72. 1863. *Bichatia stegophila* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Neudamm, Germany (FC). FIG. 48.

Chroococcus cohaerens Nägeli in Rabenhorst, Alg. Sachs. 45 & 46: 446. 1855. —Type from Freiburg, Baden, Germany (FC). FIG. 78.

Gloeocapsa nigrescens Nägeli in Rabenhorst, Alg. Sachs. 63 & 63: 629. 1857. *Bichatia nigrescens* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Gloeocapsa Corrensis* J. de Toni, Noter. Nomencl. Algol. 3. 1936. —Type from the Berner Oberland, Switzerland (ZT).

Gloeocapsa saxicola Wartmann in Rabenhorst, Alg. Sachs. 81 & 82: 813. 1859. *G. alpina* f. *saxicola* Rabenhorst, Fl. Eur. Algar. 2: 40. 1865. *Bichatia saxicola* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Gloeocapsa alpina* var. *saxicola* Rabenhorst in Hansgirg, Prodr. Algenfl. Böhmen 2: 150. 1892. —Type from St. Gallen, Switzerland (FC). FIG. 22.

Gloeocapsa alpina Nägeli ex Cramer in Rabenhorst, Alg. Sachs. 87 & 88: 869. 1859. —Type from Engelberg, Unterwalden, Switzerland (FC). See Brand, Bot. Centralbl. 83: 224. 1900. FIG. 17.

Aphanocapsa montana Cramer in Wartmann & Schenk, Schweiz. Krypt. no. 134. 1862. *A. montana* var. *micrococca* Cramer pro synonym., loc. cit. 1862. *A. montana* f. *micrococca* Cramer in Brügger, Jahresber. Naturf. Ges. Graubündens, N. F. 8: 244. 1863. *A. montana* b. *micrococca* Cramer ex Rabenhorst, Fl. Eur. Algar. 2: 50. 1865. —Type from Rigi, Switzerland (ZT).

Aphanocapsa montana var. *macrococca* Cramer in Wartmann & Schenk, Schweiz. Krypt. no. 134. 1862; Cramer in Brügger, Jahresber. Naturf. Ges. Graubündens, N. F. 8: 244. 1863. *A. montana* a. *macrococca* Cramer ex Rabenhorst, Fl. Eur. Algar. 2: 50. 1865. —Type from Trinser See, Switzerland (ZT).

Chroococcus violaceus Rabenhorst, Fl. Eur. Alg. 2: 32. 1865. —Type from Baden-Baden, Germany (L). FIG. 86.

Aphanocapsa violacea Grunow in Rabenhorst, Fl. Eur. Algar. 2: 51. 1865. —Type from Neehaus, Lower Austria (W).

Gloeocapsa Kalchbrenneri Grunow in Rabenhorst, Fl. Eur. Algar. 2: 41. 1865. *Bichatia Kalchbrenneri* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Badoczer Wiesen, Hungary (W).

Gloeocapsa Titiana Grunow in Rabenhorst, Fl. Eur. Algar. 2: 47. 1865. *Bichatia Titiana* Kuntze, Rev. Gen. Pl. 2: 866. 1891. —Type from the Euganean mountains, Italy (W).

Gloeocapsa tropica Crouan fr. in Schramm & Mazé, Essai Class. Alg. Guadeloupe, p. 29. 1865. —Type from La Guadeloupe (PC). FIG. 36.

Coccochloris tuberculosa Areschoug, Alg. Scand. Exs., Ser. Nov., 6: 292. 1866. *Aphanoshece tuberculosa* Forti, Syll. Myxophyc., p. 79. 1907. —Type from Bursjön, Uppland, Sweden (S).

Chroococcus varius A. Braun in Rabenhorst, Alg. Eur. 246—248: 2451. 1876. *C. varius* f. *fuscoluteus* A. Braun ex Wille, Nyt Mag. Naturvid. 62: 181. 1925. *Gloeocapsa varia* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 208. 1938. *Pleurocapsa varia* Drouet & Daily in Daily, Amer. Midl. Nat. 27: 644. 1942. —Type from Poppelsdorf near Bonn, Germany (FC).

Aphanocapsa bififormis A. Braun in Rabenhorst, Alg. Eur. 246—248: 2453b. 1876; A. Braun, Hedwigia 1879: 194. 1879. —Type from Berlin, Germany (FC). FIG. 30.

Aphanocapsa nebulosa A. Braun in Rabenhorst, Alg. Eur. 246—248: 2454. 1876. *Aphanoshece caldarium* Richter ex Hansgirg, Prodr. Algenfl. Böhmen 2: 136. 1892. *Gloeoshece caldarium* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 255. 1938. —Type from Berlin, Germany (FC). FIG. 69.

Gloeoshece inconspicua A. Braun in Rabenhorst, Alg. Eur. 246—248: 2455. 1876. —Type from Berlin, Germany (FC).

Entophysalis magnoliae Farlow, Mar. Alg. New England, p. 29. 1881. —Type from Magnolia, Massachusetts (FH).

Gloeocapsa Itzigsohnii Bornet in Zopf, Spaltpl., p. 60. 1882. *G. magma* var. *Itzigsohnii* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 137. 1891. *G. magma* f. *Itzigsohnii* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 176. 1938. —Type from Versailles, France (FH).

Aphanocapsa Naegeli Richter, Hedwigia 23: 66. 1884. —Type from Anger near Leipzig, Germany (L).

Gloeoshece tepidarium var. *cavernarum* Hansgirg, Bot. Centralbl. 37: 38. 1889. *G. rupestris* var. *cavernarum* Hansgirg, Prodr. Algenfl. Böhmen 2: 136. 1892. *G. palea* var. *cavernarum* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 49. 1907. —Type from Korno near Beroun, Bohemia (W). FIG. 68.

Anacystis Reinboldii Richter in Reinbold, Schrift. Naturw. Ver. Schleswig-Holst. 7(2): 180. 1889. *Microcystis Reinboldii* Forti, Syll. Myxophyc., p. 91. 1907. —Type from Friedrichsort, Germany (NY).

- Coelosphaerium anomalum* var. *minus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(1): 19. 1890. —Type from Kuchelbad near Prague (W).
- Aphanocapsa fonticola* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(1): 19. 1890. —Type from Hostin near Beroun, Bohemia (W).
- Gloeocapsa alpina* var. *mediterranea* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 356. 1891. —Type from Pingvente, Istria, Jugoslavia (W). FIG. 45.
- Aphanocapsa Richteriana* Hieronymus in Hauck & Richter, Phyk. Univ. 10: 485. 1892. —Type from Nimptsch in Silesia, Poland (L).
- Aphanothece conferta* Richter in Hauck & Richter, Phyk. Univ. 10: 487. 1892. —Type from Oschatz, Saxony, Germany (L).
- Aphanocapsa thermalis* var. *minor* Hansgirg, Prodr. Algenfl. Böhmen 2: 159. 1892. *A. violacea* var. *minor* Hansgirg ex Forti, Syll. Myxophyc., p. 75. 1907. —Type from Karlsbad, Bohemia (W). FIG. 71.
- Chroococcus varius* var. *luteolus* Hansgirg, Prodr. Algenfl. Böhmen 2: 164. 1892. —Type from Smichov, Bohemia (W). FIG. 74.
- Aphanocapsa fuscolutea* Hansgirg, Prodr. Algenfl. Böhmen 2: 156. 1892. *Microcystis Hansgirgiana* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 130. 1938. —Type from Prague, Bohemia (W).
- Chroococcus schizodermaticus* West, Trans. Roy. Microsc. Soc. 1892: 742. 1892. —Type from Cantley, Yorkshire, England (BIRM). In the type, the cells are much enlarged and parasitized.
- Pleurocapsa muralis* Lagerheim in Wittrock, Nordstedt & Lagerheim, Alg. Exs. 23: 1097. 1893. —Isotypes from Quito, Ecuador (L, MIN, NY).
- Aphanocapsa nivalis* Lagerheim, Nuova Notarisia 1894: 652. 1894. —Type from Spitzbergen, Norway (DT).
- Aphanothece saxicola* var. *sphaerica* W. & G. S. West, Trans. Roy. Microsc. Soc. 1894: 17. 1894. *A. saxicola* f. *sphaerica* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 151. 1938. —Type from Snowdon, Wales (BIRM). FIG. 55.
- Gloeocapsa gigas* W. & G. S. West, Journ. Linn. Soc. Bot. 30: 276. 1894. *Anacystis gigas* Gardner, Mem. New York Bot. Gard. 7: 15. 1927. —Type from St. Vincent, West Indies (BM).
- Aphanocapsa elachista* W. & G. S. West, Journ. Linn. Soc. Bot. 30: 276. 1894. *Microcystis pulverea* f. *elachista* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938. —Type from Dominica, West Indies (BIRM).
- Chroococcus minor* f. *minimus* W. & G. S. West, Journ. Linn. Soc. Bot. 30: 275. 1894. —Type from Dominica, West Indies (FC).
- Gloeocapsa Holstii* Hieronymus in Engler, Pflanzenwelt Ostaf. C: 8. 1895. —Type from Usumbura, Ruanda Urundi (O).
- Gloeocapsa Reicheltii* Richter in Hauck & Richter, Phyk. Univ. 13: 647. 1895; Hedwigia 34: 25. 1895; Sitzungsber. Naturf. Ges. Leipzig 19—21: 152. 1895. —Type from Leipzig, Germany (L).
- Chroococcus alpinus* Schmidle in Simmer, Allgem. Bot. Zeitschr. 1899:194. 1900. —Type from the Kolbitzsch, Carinthia, Austria (Z).
- Chroococcus decolorans* Migula, Crypt. Germ., Austr. & Helvet. Exs. 26 & 27 (Alg.): 83. 1906. —Isotypes from Eisenach, Germany (MICH, NY, TA).
- Gloeocapsa haematodes* var. *violascens* Grunow ex Forti, Syll. Myxophyc., p. 38. 1907. —Type from Kufstein, Austria (W). FIG. 70.
- Microcystis densa* G. S. West, Journ. of Bot. 47: 246. 1909. —Type from Lake Albert Nyanza, Uganda (BIRM).
- Eucapsis alpina* Clements & Shantz, Minn. Bot. Stud. 4: 134. 1909. *Merismopoedia cubica* West, Proc. Roy. Irish Acad. 31(16): 42. 1912. —Type from near Pikes Peak, Colorado (US).
- Gloeosethee samoensis* Wille in Reehinger, Bot. & Zool. Ergebn. Samoa- & Salomoninseln, Süßwasseralg., p. 6. 1914; Hedwigia 53: 144. 1913. —Type from Savaii, Samoa (O).
- Gloeocapsa aeruginosa* f. *lignicola* Wille in Reehinger, Bot. & Zool. Ergebn. Samoa & Salomoninseln, Süßwasseralg., p. 7. 1914. —Type from Upolu, Samoa (O).
- Gloeocapsa rupestris* Kütz. ex Wille, Nyt Mag. Naturvid. 62: 197. 1925. —Type from Falaise, France (L).
- Pleurocapsa Mayorii* Setchell, Publ. Carnegie Inst. Wash. Dept. Mar. Biol. 20: 258. 1924. —Type from Rose atoll, Samoa (UC). FIG. 40.
- Chondrocystis Bracei* Howe, Bull. Torr. Bot. Club 51: 355. 1924. *Gloeocapsa Bracei* J. de Toni, Not. Nomencl. Algol. 4. 1936. —Type from Long cay, Bahama islands (NY). FIG. 82.
- Chroococcus varius* f. *atrovirens* A. Braun ex Wille, Nyt Mag. Naturvid. 62: 181. 1925. —Type from Poppelsdorf near Bonn, Germany (FC). FIG. 85.
- Gloeocapsa multispherica* Gardner, Univ. Calif. Publ. Bot. 14: 1. 1927. —Type from near Foochow, China (FH). FIG. 21.
- Gloeocapsa minutula* Gardner, Univ. Calif. Publ. Bot. 14: 2. 1927. —Type from Huangchun, Foochow, China (FH).

- Aphanocapsa intertexta* Gardner, Mem. New York Bot. Gard. 7: 4. 1927. —Type from near Adjuntas, Puerto Rico (NY). FIG. 32.
- Chroococcus cubicus* Gardner, Mem. New York Bot. Gard. 7: 5. 1927. —Type from Santurce, Puerto Rico (NY). FIG. 31.
- Aphanoshece opalescens* Gardner, Mem. New York Bot. Gard. 7: 5. 1927. —Type from Maricao, Puerto Rico (NY). FIG. 28.
- Chroococcus muralis* Gardner, Mem. New York Bot. Gard. 7: 7. 1927. —Type from Coamo Springs, Puerto Rico (NY). FIG. 26.
- Gloeocapsa livida* var. *minor* Gardner, Mem. New York Bot. Gard. 7: 10. 1927. *G. livida minor* Gardner, New York Acad. Sci. Sci. Surv. Porto Rico 8: 258. 1932. —Type from Hato Arriba near Arecibo, Puerto Rico (NY). FIG. 52.
- Gloeocapsa calcicola* Gardner, Mem. New York Bot. Gard. 7: 11. 1927. —Type from Laguna Tortuguero, Puerto Rico (NY). FIG. 39.
- Gloeoshece endochromatica* Gardner, Mem. New York Bot. Gard. 7: 13. 1927. —Type from near Arecibo, Puerto Rico (NY). FIG. 53.
- Gloeoshece parvula* Gardner, Mem. New York Bot. Gard. 7: 14. 1927. —Type from Hato Arriba near Arecibo, Puerto Rico (NY). FIG. 35.
- Anacystis nigropurpurea* Gardner, Mem. New York Bot. Gard. 7: 18. 1927. —Type from near Arecibo, Puerto Rico (NY). FIG. 75.
- Anacystis nigroviolacea* Gardner, Mem. New York Bot. Gard. 7: 19. 1927. —Type from near Utuado, Puerto Rico (NY).
- Anacystis compacta* Gardner, Mem. New York Bot. Gard. 7: 20. 1927. —Type from Caguas, Puerto Rico (NY). FIG. 25.
- Anacystis magnifica* Gardner, Mem. New York Bot. Gard. 7: 21. 1927. —Type from San Juan, Puerto Rico (NY). FIG. 58.
- Anacystis distans* Gardner, Mem. New York Bot. Gard. 7: 21. 1927. —Type from Maricao, Puerto Rico (NY).
- Anacystis amplivesiculata* Gardner, Mem. New York Bot. Gard. 7: 22. 1927. —Type from Maricao, Puerto Rico (NY). FIG. 20.
- Anacystis gloeocapsoides* Gardner, Mem. New York Bot. Gard. 7: 22. 1927. —Type from Mayaguez, Puerto Rico (NY). FIG. 44.
- Anacystis microsphaeria* Gardner, Mem. New York Bot. Gard. 7: 22. 1927. —Type from Coamo Springs, Puerto Rico (NY).
- Anacystis pulchra* Gardner, Mem. New York Bot. Gard. 7: 23. 1927. —Type from near Maricao, Puerto Rico (NY). FIG. 63.
- Anacystis nidulans* Gardner, Mem. New York Bot. Gard. 7: 23. 1927. —Type from Mayaguez, Puerto Rico (NY). FIG. 62.
- Anacystis Willei* Gardner, Mem. New York Bot. Gard. 7: 24. 1927. —Type from Mayaguez, Puerto Rico (NY).
- Anacystis irregularis* Gardner, Mem. New York Bot. Gard. 7: 24. 1927. —Type from Coamo Springs, Puerto Rico (NY).
- Anacystis consociata* Gardner, Mem. New York Bot. Gard. 7: 25. 1927. —Type from Santurce, Puerto Rico (NY).
- Anacystis minutissima* Gardner, Mem. New York Bot. Gard. 7: 25. 1927. —Type from near Cabo Rojo, Puerto Rico (NY). FIG. 73.
- Anacystis radiata* Gardner, Mem. New York Bot. Gard. 7: 26. 1927. —Type from Coamo Springs, Puerto Rico (NY). FIG. 60.
- Anacystis radiata* var. *major* Gardner, Mem. New York Bot. Gard. 7: 26. 1927. *A. radiata major* Gardner, New York Acad. Sci. Sci. Surv. Porto Rico 8: 263. 1932. —Type from Coarho Springs, Puerto Rico (NY). FIGS. 51 and 56.
- Anacystis anomala* Gardner, Mem. New York Bot. Gard. 7: 26. 1927. —Type from Fajardo, Puerto Rico (NY).
- Endospora rubra* Gardner, Mem. New York Bot. Gard. 7: 28. 1927. —Type from Coamo Springs, Puerto Rico (NY). FIG. 57.
- Endospora olivacea* Gardner, Mem. New York Bot. Gard. 7: 29. 1927. —Type from Caguas, Puerto Rico (NY). FIG. 41.
- Endospora bicoccus* Gardner, Mem. New York Bot. Gard. 7: 28. 1927. —Type from near Maricao, Puerto Rico (NY). FIG. 34.
- Endospora mellea* Gardner, Mem. New York Bot. Gard. 7: 28. 1927. —Type from near Utuado, Puerto Rico (NY). FIG. 29.
- Endospora nigra* Gardner, Mem. New York Bot. Gard. 7: 29. 1927. —Type from near Sabana Grande, Puerto Rico (NY). FIG. 24.
- Placoma Willei* Gardner, Mem. New York Bot. Gard. 7: 29. 1927. —Type from Maricao, Puerto Rico (NY). FIG. 66.

- Entophyalis violacea* Gardner, Mem. New York Bot. Gard. 7: 30. 1927. *E. Willei* Gardner, New York Acad. Sci. Sci. Surv. Porto Rico 8(2): 260. 1932. —Type from Hato Arriba near Arecibo, Puerto Rico (NY).
- Aphanothece uliginosa* W. R. Taylor, Proc. Acad. Nat. Sci. Philadelphia 80: 86. 1928. —Type from Purcell range, British Columbia (TA).
- Gloeocapsa Dvorakii* Nováček, Zpravy Kom. Přírodov. Moravy a Slezka, Oddel. Bot., 7: 1. 1929. —Type from Mohelno, Moravia (D). FIG. 59.
- Entophyalis atrovioleacea* Nováček, Prace Moravské Přírodov. Společn. 7(3): 1. 1932. —Type from Mohelno, Moravia (D). FIG. 18.
- Gloeocapsa compacta* var. *coeruleoatra* Nováček in Dvorák & Nováček, Sborn. Klub. Přírodov. Brne 15: 5. 1933. —Type from Mohelno, Moravia (D). FIG. 43.
- Gloeocapsa pleurocapsoides* Nováček in Dvorák & Nováček, Sborn. Klub. Přírodov. Brne 15: 5. 1933. —Type from Mohelno, Moravia (D). FIG. 89.
- Chroococcidiopsis thermalis* Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 625. 1933. —Type from Kadjaj, Sumatra, Indonesia (in the collection of L. Geitler).
- Gloeocapsa nigrescens* f. *virrea* Nováček, Mohelno 1934: 110, 144. 1934. —Type from Mohelno, Moravia (D). FIG. 47.
- Gloeocapsa chroococcoides* Nováček, Mohelno 1934: 100, 139. 1934. —Type from Mohelno, Moravia (D). FIG. 54.
- Gloeotheca tophacea* Skuja in Handel-Mazzetti, Symb. Sinicae 1: 15. 1937. —Type from Dschungdien, Yunnan, China (W).
- Synechococcus ambiguus* Skuja in Handel-Mazzetti, Symb. Sinicae 1: 16. 1937. —Type from Dschungdien, Yunnan, China (W). FIG. 67.
- Coelosphaerium limnicola* Lund, Journ. of Bot. 1942: 66. 1942. —Type from Richmond Park, Surrey, England (in the collection of J. W. G. Lund). FIG. 76.
- Anacystis hyalina* Chu, Sinensia 15: 153. 1944. *Asterocapsa hyalina* Chu, Ohio Journ. Sci. 52: 100. 1952. —Type from Chin-Chen-Shan, Szechwan, China (FC).
- Gloeocapsa incrustata* Chu, Sinensia 15: 154. 1944. —Type from Chin-Chen-Shan, Szechwan, China (FC).
- Entophyalis sinensis* Chu, Sinensia 15: 154. 1944. —Type from Chin-Chen-Shan, Szechwan (FC).
- Gloeotheca rhodochlamys* Skuja, Nova Acta Reg. Soc. Sci. Uppsal., ser. 4, 14(5): 18. 1949. —Type from Kyauktan, Rangoon, Burma (FC). FIG. 72.
- Original specimens have not been seen for the following names; their original descriptions are here designated as the Types until the specimens can be found:
- Lepraria atra* Acharius, Lich. Univ., p. 668. 1810. *Globulina atra* Turpin, Végét. Acot., pl. 6, fig. 2, in Dict. Sci. Nat., vol. 65. 1816—29; Turpin, Mém. Mus. d'Hist. Nat. Paris 14: 26, 63. 1827. *Protococcus ater* Kützing, Linnaea 8: 368. 1833. *Microcystis atra* Kützing, ibid. 8: 375. 1833. *Bichatia atra* Trevisan, Nomencl. Alg. 1: 60. 1845.
- Protococcus violaceus* Corda in Sturm, Deutschl. Fl., II, 6: 37. 1833. *Microcystis violascea* Kützing, Linnaea 8: 373. 1833. *Haematococcus violasceus* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5(Sci. Fis. & Mat.): 9, 24. 1843. *Protosphaeria violascea* Trevisan, Sagg. Monogr. Alg. Coccot., p. 28. 1848. *Gloeocapsa violascea* Rabenhorst, Fl. Eur. Algar. 2: 41. 1865. *Bichatia violascea* Kuntze, Rev. Gen. Pl. 2: 886. 1891.
- Haematococcus alpestris* Hassall, Hist. Brit. Freshw. Alg. 1: 328. 1845. *Pleurococcus alpestris* Trevisan, Sagg. Monogr. Alg. Coccot., p. 34. 1848.
- Haematococcus theriacus* Hassall, Hist. Brit. Freshw. Alg. 1: 333. 1845. *Bichatia theriaca* Trevisan, Sagg. Monogr. Alg. Coccot., p. 58. 1848.
- Synechococcus parvulus* Nägeli, Gatt. Einzell. Alg., p. 56. 1849. —Nägeli's sketch and notes, in the Pflanzenphysiologisches Institut, Eidgenössische Technische Hochschule, Zürich, are reproduced here: FIG. 90A.
- Chroococcus refractus* Wood, Proc. Amer. Philos. Soc. 11: 122. 1869.
- Palmella fuscata* Zanardini, N. Giorn. Bot. Ital. 10: 40. 1878.
- Sphaerogonium nigrum* Rostafinski, Rozpr. Akad. Umiej. Krakow., Wyd. Mat.-Przyr., 10: 300. 1883.
- Polycystis amethystina* Filarszky, Hedwigia 39: 139. 1900. *Microcystis amethystina* Forti, Syll. Myxophyc., p. 89. 1907.
- Planosphaerula natans* Borzi, Nuova Notarisia 1905: 20. 1905.
- Gloeocapsa thermalis* Lemmermann, Engler Bot. Jahrb. 34: 614. 1905.
- Gloeocapsa haematodes* var. *brunneola* Kirchner ex Forti, Syll. Myxophyc., p. 38. 1907.
- Clastrorocystis montana* Teodorescu, Beih. z. Bot. Centralbl. 21(2): 106. 1907. *Microcystis montana* J. de Toni, Diagn. Algar. Nov. I., Myxophyc. 6: 570. 1939.

- Chroococcus aurantiacus* Bernard, Protococc. & Desmid. d'Eau Douce, p. 48. 1908. *C. Detonii* Bernard, Nova Guinea, Rés. de l'Exped. Sci. Néerl. à la Nouv. Guinée, 1907 & 1909, 8(2, Bot.): 259. 1910.
- Chroococcus Reckingeri* Wille in Reckinger, Denkschr. K. Akad. Wiss. Wien, Math.-Nat. Kl., 91: 160. 1915.
- Microcystis pulverea* var. *major* Elenkin, Estest.-Istorich. Koll. Gr. E. P. Sheremetevoi S. E. Mikhailovsk. Moskovskoi Gub. VI, Vodor. Okt. 1, Schizophyc, p. 6. 1915.
- Microcystis amethystina* var. *vineae* Printz, K. Norske Videnskab. Selsk. Skr. 1920(1): 33. 1920.
- Myxosarcina concinna* Printz, K. Norske Videnskab. Selsk. Skr. 1920(1): 35. 1920.
- Chroococcus minor* f. *violaceus* Wille in Hedin, Southern Tibet 6(3, Bot.): 165. 1922.
- Chroococcus cohaerens* var. *antarcticus* Wille, Deutsche Südpolar-Exped. 1901—02, 8: 382. 1924.
- Synechocystis Pevalékii* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 77. 1925.
- Gloeocapsa alpina* var. *polyedrica* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 80. 1925.
- Gloeocapsa alpina* f. *violascens* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 80. 1925.
- Gloeocapsa biformis* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 80. 1925.
- Gloeocapsa biformis* f. *dermochroa* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 81. 1925.
- Gloeocapsa biformis* f. *punctata* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 81. 1925.
- Synechocystis minuscula* Woronichin, Arch. f. Hydrobiol. & Planktonk. 17: 642. 1926.
- Gloeocapsa lacustris* Huber-Pestalozzi, Arch. f. Hydrobiol. & Planktonk. 16: 162. 1926.
- Eucapsis alpina* var. *minor* Skuja, Acta Horti Bot. Univ. Latv. 1(3): 155. 1926. *E. minor* Elenkin, Acta Inst. Bot. Acad. Sci. U. R. P. S. S., ser. 2, Pl. Crypt. 1: 15. 1933.
- Aphanocapsa Grevillei* f. *densa* Strøm, Norweg. Mountain Alg., p. 148. 1926.
- Chroococcus sarcinoides* Huber-Pestalozzi, Verh. Int. Ver. Theor. & Ang. Limnol. 4: 366. 1929.
- C. Huberi* J. de Toni, Noter. Nomencl. Algol. 3. 1936.
- Gloeocapsa dirumpens* Beck-Mannagetta, Arch. f. Protistenk. 66: 9. 1929.
- Gloeotheca ustulata* Beck-Mannagetta, Arch. f. Protistenk. 66: 9. 1929.
- Entophysalis Perrieri* Frémy, Ann. Crypt. Exot. 3: 207. 1930.
- Chroococcus minor* f. *glomeratus* Frémy, Bull. Soc. Bot. France 77: 673. 1930. *Gloeocapsa minor* f. *glomerata* Frémy ex Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 239. 1938.
- Chroococcus verrucosus* Krieger, Hedwigia 70: 151. 1931.
- Chroococcus niger* Starmach, Acta Soc. Bot. Polon. 11: 293. 1934.
- Microcystis thermalis* Yoneda, Acta Phytotax. & Geobot. 7: 139. 1938.
- Aphanotheca cetrariae* Frémy, Bull. Soc. Linn. Normandie, ser. 9, 3: 21. 1943.
- Anacystis trochiscioides* Jao, Sinensia 15: 75. 1944. *Asterocapsa trochiscioides* Chu, Ohio Journ. Sci. 52(2): 100. 1952.
- Anacystis purpurea* Jao, Sinensia 15: 76. 1944.
- Chroococcus limneticus* var. *multicellularis* Chu, Ohio Journ. Sci. 52(2): 96. 1952.
- Gloeocapsa attingens* Schiller, Sitzungsber. Oesterr. Akad. Wiss., Math.-Nat. Kl., 1, 163: 125. 1954.

Plantae aerugineae, rubrae, nigrae, violaceae, vel olivaceae, in stratum gelatinosum vel libere inter alias algas evolventes, cellulis in divisione binis depresso—sub-sphaericis (raro truncato-hemisphaericis) aetate provecta globosis diametro 2—6 μ (ad 20 μ ubi a fungis parasitatis) crassis, per gelatinum vaginale sine ordine aut in seriebus eucapsoideis distributis; gelatino vaginale homogeneo vel lamelloso, primum hyalino deinde vulgo partim vel omnino rubrescente vel coerulescente vel lutescente; protoplasmate aerugineae, olivaceae, vel violaceae, homogeneo vel granuloso. FIGS. 16—90A.

In strata and among other algae on rocks, wood, and soil wet by rains, and especially in seepage; often found in temporary pools and on emergent shores. The red and blue pigments in the gelatinous matrix, apparently developing in response to desiccation and exposure to direct sunlight, seem to be influenced by the acidity or alkalinity of the substratum. According to Cramer in Rabenh. Alg. no. 869 (1859), Nägeli and Wartmann noted that mounting in acid solutions changes the color of the matrix from blue to red, and that this change can be reversed in alkaline solutions. The same was remarked by Wartmann in Rabenh. Alg. no. 813 (1859). It had long been our own observation that formalin-preserved material almost invariably exhibits red sheaths. O. Jaag & N. Gensch in Verh.

Schweiz. Naturf. Ges. Locarno 1940: 158—159 (1940) and Gensch in Beih. Schweiz. Bot. Ges. 53: 121—192 (1943) report careful observational and experimental work on this matter. Yellow and brown pigments are also produced in the gelatinous matrix; perhaps fungi are responsible for these.

Fungus hyphae often enter the protoplasts themselves, causing the cells to enlarge and to cease the secretion of gelatinous material. The hyphae of some fungi form conspicuous (often ornamented) walls about the protoplasts; this phenomenon is the basis for the reports of thick-walled spores in *Anacystis montana*. It has been observed that such parasitization results in the death of cells of *Anacystis montana*; future observations may disclose that there exist fungi which, parasitizing this alga, do not destroy it but continue to grow with it as a lichen.

Bacteria, palmelloid Chlorophyceae, *Entophysalis deusta*, and dissociated cells of *Agmenellum* spp. and *Gomphosphaeria lacustris* may sometimes be confused with *Anacystis montana*.

Specimens examined:

SPITZBERGEN: "Chlamydococcus nivalis. Spitzberg. Ex herb. Zanardini." (Type of *Aphanocapsa nivalis* Lagerh., DT); King's bay, T. M. Fries, Aug. 1868 (S). FINLAND: Karis, R. Grönblad, Apr. 1935 (S). SCANDINAVIA?: with *Sigonema* (*Siroisiphon*) *panniforme*, Kunze in herb. Kützing (Type of *Gloeocapsa rubicunda* Kütz., L). NORWAY: K. Sprengel, as *G. rupicola* in herb. Kützing (L); in *Neckera oligocarpa* Schimp, ad latera saxorum prope pontem Stuelsboren, Ringeboe, Gudbrandsdalen, J. E. Zetterstedt & J. A. O. Wickbom, 22 Jun. 1870 (FC). SWEDEN: Hessingen ved Stockholm, 1823, in herb. Agardh (Type of *Palmella? sanguinea* Ag., LD [Fig. 80]; isotypes, K, S, UC); in lacu Bursjön in Uplandia, V. B. Witrock, Aug. (Type of *Coccochloris tuberculosa* Aresch. in Areschoug, Alg. Scand. Exs., Ser. Nov., no. 292, S; isotypes, FC, L, NY, UC); ad lapides in Lassby backar prope Upsaliam, G. Lagerheim, 28 Mar. 1882 (as *Gloeocapsa opaca* in Wittr. & Nordst., Alg. Exs., no. 597, FC, L, S); in rupibus ad Danviken prope Holmiam, Lagerheim, Nov. 1881 (as *G. magna* in Wittr. & Nordst., Alg. Exs. no. 500b, FC, L, S); ad Nacka qvarnar prope Stockholmiam, Lagerheim, Jun. 1883 (as *G. versicolor* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1542, L, S); in aqueducta ad Nacka pr. Stockholmiam, N. Wille, Jun. 1884 (D, S); ad saxa humida prope Quickjock in Lapponia Luulens, Lagerheim, Jul. 1883 (S; as *G. alpicola* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1540, L, NY); Scania, J. Agardh, 1843 (L); Hammarbysjön pr. Stockholmiam, Lagerheim, Jun. 1881 (S); Vassijokk, Torne Lappmark, O. Borge 105, 116, Jul. 1909 (S); Drottningholm, Borge, Mai 1920 (S); Möja, Borge 33/43, Aug. 1933 (S); Kullaborge, Skåne, Borge, Oct. 1898 (S); Arboga, O. F. Andersson, Nov. 1888 (S); Hederviken, Uppsala, Areschoug, Jul. 1857 (S), Aug. 1863 (S).

POLAND: Breslau, im Warmhaus des bot. Gartens, W. Migula, Feb. 1888 (S; as *Chroococcus varius* in Hauck & Richt., Phyk. Univ. no. 484, L, UC); Riesengebirge, Flotow, Sept. 1851 (S); Silesia, in herb. Kützing (L); feuchte Steinwand auf Burg Kynast, G. Hieronymus 746, Sept. 1887 (MICH; as *Chroococcus cohaerens* in Hauck & Richt., Phyk. Univ. no. 243, L); in caldario horti botanici, Breslau, B. Schröder, Nov. 1894 (S); bei Strehlen, Hilse (as *Palmella testacea* in Rabenh. Alg. no. 1524, UC); an den Felswänden am Galgenberge bei Strehlen in Schlesien, Hilse (as *Gloeocapsa opaca* in Rabenh. Alg. 1169, FC); an überrieselten Felswänden in Steinbrüchen bei Gross-Willkau, Kreis Nimptsch in Schlesien, Hieronymus, 2 Okt. 1891 (TA; Type of *Aphanocapsa Richteriana* Hieron. in Hauck & Richt., Phyk. Univ. no. 485, L; isotypes, MIN, UC). ROMANIA: Bucuresti-Cotroceni, in caldario horti botanici ad muros, E. C. Teodorescu 1384, 23 Dec. 1903 (FC, W).

GERMANY: Schleswig-Holstein: auf Sand am Strande nördlich Friedrichsort, T. Reinbold, Sept. 1890 (Type of *Anacystis Reinboldii* Richt. in Hauck & Richt., Phyk. Univ. no. 447, NY; isotype, MIN); Kiel, Reinbold (DT). Brandenburg: Berliner bot. Garten, Palmhaus, G. Lagerheim, Oct. 1882 (S), ad parietem caldarium, Lagerheim, 9 Oct. 1882 (as *Gloeocapsa granosa* in Wittr. & Nordst., Alg. Exs. no. 595, FC, D, L, S), im Orchideenhaus, A. Braun, Nov. 1875 (Type of *Aphanocapsa nebulosa* A. Br. in Rabenh. Alg. no. 2454, FC [Fig. 69]; isotypes, S, TA; Type of *Gloeohypha inconspicua* A. Br. in Rabenh. Alg. 2455, FC; isotype, D), Oct. 1875 (as *A. nebulosa* in Rabenh. Alg. 2454b, FC), Mai 1875 (Type of *A. biformis* A. Br. in Rabenh. Alg. no. 2453, FC, [Fig. 30]; isotypes, L, NY, TA, S; in Roumeguère, Alg. de Fr. no. 616, L); an der Hinterwand des Warmhauses in Universitätsgarten zu Berlin, Braun, Dec. 1875 (as *A. biformis* in Rabenh. Alg. no. 2453b, FC, L, NY, S, TA); Neudamm, Itzigsohn, Dec. 1852 (Type of *Monocapsa stegophila* Itzigs. in Rabenh. Alg. no. 263, FC [Fig. 48]; isotype, L). Saxony: im Taubensbachthale bei der Schweizermühle, Biene, Mai 1862 (as *Gloeocapsa magna* in Rabenh. Alg. no. 1334, UC); Porphyrfelsen bei Grimma, G. Winter, 5 Apr. 1868 (UC); auf den steinernen Stufen zum Altarraum in der Kirche zu Döben bei Grimma, P. Richter (as *G. bituminosa* in Hauck & Richt.,

Phyk. Univ. no. 749, L, NY, S); an einem Brunnen in Königstein, *Richter*, Sept. 1880 (TA); Uetwalde, *C. Cramer* (as *G. opaca* in Rabenh. Alg. no. 544, FC, FH, L), Aug. 1854 (FH), *Richter*, 26 Mai 1880 (as *G. sanguinea* in Witr. & Nordst., Alg. Exs. no. 499, FC, L, S), Jun. 1881 (TA), 29 Mai 1882 (as *G. quaternata* in Witr. & Nordst., Alg. Exs. no. 598, FC, D, L, S), 27 Mar. 1884 (as *G. sabulosa* in Witr. & Nordst., Alg. Exs. no. 698, FC, L, PC, S), without date (FC, UC); in der sächsischen Schweiz, an Felsen, *Hantzsch* (UC), an feuchten Felswänden (as *G. magma* in Rabenh. Alg. no. 84, FC, L, NY, TA; in Breutel, Alg. Exs. no. 328, L; as *G. ambigua* var. in Rabenh. Alg. no. 32, FC, L, NY, TA); in rupibus humectis ad Hohnstein prope Dresdam, *Richter*, 28 Mai 1881 (as *G. magma* in Witr. & Nordst., Alg. Exs. no. 500, FC, L, S); an einer schwach überrieselten Steinwand in Steinbrüche zu Beucha bei Brandis um Leipzig, *H. Reichelt*, Sept. 1890 (Type of *G. Reicheltii* Richt. in Hauck & Richt., Phyk. Univ. no. 647, L; isotype, MIN); Moritzburg, auf Wasser schwimmend (as *Microcystis ichthyoblabe* in Rabenh. Alg. no. 16, FC); in einem Gewächshause, Oschatz, *E. May*, Feb. 1892 (Type of *Aphanothece conferta* Richt. in Hauck & Richt., Phyk. Univ. no. 487, L; isotypes, MIN, UC); Leipzig, an den Wänden des Gewächshauses im bot. Garten, *Richter* (UC); an einer feuchten Wand im Gewächshause der Dreyzehnerschen Gärtnerei in Anger bei Leipzig, *Richter*, Apr. 1888 (Type of *Aphanocapsa Naegelsii* Richt. in Hauck & Richt., Phyk. Univ. no. 195, L; isotype, MIN); in einem Warmhause in Anger, *Richter*, Feb. 1879 (L, S), Apr. 1879 (TA); in parietes caldarii ad Anger, *Richter*, 12 Apr. 1881 (as *Chroococcus varius* and *Aphanocapsa biformis* in Witr. & Nordst., Alg. Exs. no. 600, FC, D, L, S; with *Protococcus grummosus* Richt. in Witr. & Nordst., Alg. Exs. no. 1090, FI). Thuringia: bei Gotha, *A. Braun* (NY); Kohnstein, herb. Kützing (L); an Steinen im Gehege, Nordhausen, *F. T. Kützing* (Type of *Protococcus fusco-ater* Kütz., L [Fig. 46]); Gypsberg, *Wallroth* in herb. Kützing (L); an Gypsfelsen bei Sachswerfen, *Kützing*, Aug. 1839 (Type of *Gloeocapsa sanguinolenta* Kütz., L [Fig. 61]; isotype, UC); "Palmella placentalis Wallr.", auf Gipsberge bei Steigerthal, *Wallroth*, Apr. 1839 (Type of *G. coracina* Kütz., L); Hercynia, in herb. Kützing (Type of *G. conglomerata* Kütz., L [Fig. 81]; isotype, UC); Nordhausen, *Kützing* (Type of *G. aeruginosa* Kütz., L [Fig. 90]); isotype, UC); an Felsen beim Weissenfelder-See, *F. Hauck*, 16 Aug. 1881 (L); Eisenach, Betonmauer des Nessewehres, *W. Migula*, Sept. 1905 (Isotypes of *Chroococcus decolorans* Mig. in Migula, Crypt. Germ. Austr. & Helv. Exs., Alg. no. 83, MICH, NY, TA); Tambach, an feuchten Felsen der Talsperre, *Migula*, 7 Sept. 1928 (as *Gloeocapsa dermochroa* in Migula, Crypt. Germ. Austr. & Helv. Exs., Alg. no. 235, FC, NY, S, TA, Z). Bavaria: Berchtesgaden, *P. Magnus*, Sept. 1874 (FH); Weg nach dem Königssee, Berchtesgaden, *Magnus*, 1874 (NY); an der Wand eines Gewölbes der über den Rödelheim führenden Brücke des Donau-Mainkanales bei Erlangen, *P. Reinsch*, März 1864 (as *Gloeocapsa atrata* with *Coccochloris stagnina* Spreng. in Rabenh. Alg. no. 1914, FC); Oberstdorf, an feuchten Kalkfelsen, *Migula*, Juli 1926 (S; as *Gloeocapsa sanguinea* in Migula, Crypt. Germ. Austr. & Helv. Exs. Alg. no. 258, FC, TA). Württemberg: Canstatt, am Rande einer Mineralwasser-Bassin, *G. Zeller* (as *Chroococcus minor* in Rabenh. Alg. no. 1143, FC). Rhineland: an der Wand eines Warmhauses zu Poppelsdorf bei Bonn, *C. Bouché*, Sept. 1875 (Type of *Chroococcus varius* A. Br. in Rabenh. Alg. no. 2451, FC; isotypes, L, S, TA), *A. Braun*, Sept. 1875 (Type of *C. varius* f. *atrovirens* A. Br. in Rabenh. Alg. no. 2452, FC [Fig. 85]; isotypes, L, S, TA, UC). Baden: Hirschenprung im Höllenthal, *B. Wartmann*, Jun. 1854 (as *Palmella microspora* in Rabenh. Alg. no. 406, FC, L); Freiburg, *A. Braun*, Oct. 1847 (Type of *Palmella brunnea* A. Br., L [Fig. 87]; isotype, NY), an Mühleradern, *A. Braun*, Apr. 1848 (FH, ZT), auf dem Mörtel alter pfutzigen Mauern, *Braun* 117, Oct. 1848 (L); im Warmhause des bot. Gartens zu Freiburg, *Wartmann*, Oct. 1854 (Type of *Chroococcus cohaerens* Näg. in Rabenh. Alg. no. 446, FC [Fig. 78]; isotypes, FH, L, NY); in den Thermalbrunnen, Badensweiler, *Braun* 129, Apr. 1848 (L), Aug. 1848 (L); Karlsruhe, *Braun*, Nov. 1845 (L), Apr. 1848 (UC); Karlsruhe, an den Mauern eines Gewächshauses, *W. Migula*, Feb. 1905 (as *Gloeocapsa granosa* in Migula, Crypt. Germ. Austr. & Helv. Exs., Alg. no. 98, MICH, TA, Z); an den Speichen eines Wasserrades bei Constanx, *E. Stizenberger*, Aug. 1857 (as *G. ambigua* var. *violacea* with *Coccochloris stagnina* Spreng. in Rabenh. Alg. no. 607, FC, MIN, L, PC; in Jack, Leiner & Stizenb., Kryptog. Badens no. 1, TA, UC); Baden, *W. F. R. Surinagar* 1072, Sept. 1862 (Type of *Chroococcus violaceus* Rabenh., L [Fig. 86]).

CZECHOSLOVAKIA: Moravia: Mohelno, *J. Suza*, Jul. 1931 (Type of *Gloeocapsa compacta* var. *coeruleoatra* Nov., D [Fig. 43]; isotype, FC), *F. Nováček*, 10 Mar. 1926 (Type of *G. nigrescens* f. *vitrea* Nov., D [Fig. 47]; isotype, FC), 21 Apr. 1926 (D, FC), May 1926 (D, FC), 31 Jul. 1926 (Type of *Entophysalis atrovioleacea* Nov., D [Fig. 18]; isotype, FC), 9 Aug. 1926 (Type of *Gloeocapsa chroococcoides* Nov., D [Fig. 54]; isotype, FC), 24 Sept. 1926 (D, FC), 21 Oct. 1926 (Type of *G. pleurocapsoides* Nov., D [Fig. 89]; isotype, FC), 22 Oct. 1926 (D, FC), 19 Sept. 1927 (D, FC), 22 Sept. 1927 (D, FC), 4 Oct. 1928 (D, FC), 20 Oct. 1928 (Type of *G. Dvorakii* Nov., D [Fig. 59]; isotype, FC), 20 Oct. 1930 (D, FC), 17 Apr. 1932 (D, FC), 8 Mar. 1933 (D, FC), 11 Mar. 1933 (D, FC), 12 Mar. 1933 (D, FC). Slovakia: Felkenthal, an der Granaten-Wand, Tatra, *G. Hieronymus* 736, Aug. 1888 (MICH: as *G. Ralsiana* in Hauck & Richt., Phyk. Univ. no. 334, L). Bohemia: Belá, *A. Hansgirk*, Aug. 1883 (FC, W); Brenn-Schiessnitz prope Böhmis-Leipa, *Hansgirk*, Sept. 1890 (FC, W); Budnany, na klouzavce, *Hansgirk*, Jul. 1884 (FC, W); Chuchel, *Hansgirk*, Apr. 1884 (FC, W), Nov. 1884 (FC, W); Chvateruby u Kralup, *Hansgirk*, Apr. 1888 (FC, W); Dittersbach—Hinter-Dittersbach, *Hansgirk*, Jul. 1889 (FC, W);

Dux, *Hansgirk*, Aug. 1883 (FC, W); Edmundsklamm prope Herrnskretchen, *Hansgirk*, Sept. 1890 (FC, W); Pamperlhütte bei Eisenstein, *Hansgirk*, Aug. 1887 (FC, W); Friedland prope Reichenberg, *Hansgirk*, 1891 (FC, W); Habstein, *Hansgirk*, Jul. 1883 (FC, W); in lapidibus calcareis viaductus magni ad Hlubocép in agro Pragensi, *Hansgirk* (as *Gloeocapsa rupicola* in Fl. Exs. Austro-Hung. no. 3199, L, MO, S); Hohenfurth, *Hansgirk*, Aug. 1884 (FC, W); an Kalksteinen in offenen Felsenbrunnen bei Hostin nächst Beroun, *Hansgirk*, Jul. 1888 (Type of *Aphanocapsa fonticola* Hansg., W; isotype, FC); teplá voda, Hradec Kralove, *Hansgirk*, Sept. 1883 (FC, W); horní cást údolí u Karlíka pod Roblínem, *Hansgirk*, Jul. 1888 (FC, W); Mauern unter dem Sprudel, Carlsbad, *Hansgirk*, Jul. 1886 (FC, W); Karlsbad, am sog. kleinen Sprudel u.s.w. im Bette der Tepl unter der Sprudelkolonnade, *Hansgirk*, Aug. 1883 (Type of *A. thermalis* var. *minor* Hansg., W [Fig. 71]; isotype, FC); Karlstein, u hradu, *Hansgirk*, Jul. 1884 (FC, W); Koda prope Karlstein, Sedlec prope Lodenice, *Hansgirk*, May 1890 (FC, W); auf mässig beleuchteten Stellen der Kaskadenhöhle unterhalb Korno nächst Beraun, *Hansgirk*, Sept. 1888 (Type of *Gloeotheca tepidarium* var. *cavernarum* Hansg. and *G. rupestris* var. *cavernarum* Hansg., W; isotype, FC [Fig. 68]); Krc, *Hansgirk*, Sept. 1886 (FC, W); Krumlov, *Hansgirk*, Aug. 1883 (FC, W), Aug. 1884 (FC, W); in den Sandgruben oberhalb Kuchelbad nächst Prag, *Hansgirk*, Apr. 1883 (Type of *Coelostphaerium anomalum* var. *minus* Hansg., W; isotype, FC); plovárna, Litomerice, *Hansgirk*, Jul. 1884 (FC, W); mlýny v Labi, Lovosice, *Hansgirk*, Jul. 1884 (FC, W); Peiperz-Maxdorf prope Bodenbach, *Hansgirk*, Sept. 1890 (FC, W); Vereinsgarten, Prag, *Hansgirk*, Jan. 1885 (FC, W); auf feuchten Fensterscheiben im Vermehrungshause des Prager Vereinsgartens, *Hansgirk*, Oct. 1884 (Type of *Aphanocapsa fuscolutea* Hansg., W; isotype, FC); Krumlov, Právápno, *Hansgirk*, Sept. 1884 (FC, W); kameny studánka, Rovné pod Pipem u Roudnice, *Hansgirk*, Jul. 1884 (FC, W); in rupibus madidis ad Selc in agro Pragensi, *Hansgirk*, Jun. 1886 (as *Gloeocapsa ambigua* in Witt. & Nordst., Alg. Exs. no. 1099, L, S); Selc u Prahy, *Hansgirk*, Sept. 1885 (FC, W), Nov. 1886 (FC, W); Kinski Zahrada, Smichov, *Hansgirk*, Dec. 1883 (FC, W); im Vermehrungshause des k. k. botanischen Gartens am Smichow, *Hansgirk*, Jan. 1884 (Type of *Chroococcus varius* var. *luteolus* Hansg., W [Fig. 74]; isotype, FC); Spindelmühle im Riesengebirge, *Hansgirk*, Nov. 1883 (FC, W); Spitzberg im Böhmerwalde (u tunelu), *Hansgirk*, Aug. 1883 (FC, W); Stribro, *Hansgirk*, Aug. 1883 (FC, W); Stupic prope Tábor, *Hansgirk*, Aug. 1888 (FC, W); Tábor, *Hansgirk*, Aug. 1883 (FC, W); Riesengebirge, v. Flotow (Type of *Ephebe pubescens* d. *cruenta* Flot., S); skály pod Tetínem nad Berounkou, *Hansgirk*, Sept. 1888 (FC, W); viadukt na Svanice, *Hansgirk*, Mar. 1883 (FC, W); Volsany u Nepomuk, *Hansgirk*, Aug. 1887 (FC, W); Zel. Brod, *Hansgirk*, Jul. 1885 (FC, W); Zleby prope Caslov, *Hansgirk*, 1891 (FC, W).

HUNGARY: in terra muscosa calce incrustata et aqua minerali humectata, Badoczer Wiesen, *Kalchbrenner* (Type of *Gloeocapsa Kalchbrenneri* Grun., W).

AUSTRIA: Lower Austria: in horto botanico Vindobonensi, *A. Kerner* (as *G. sanguinea* in Fl. Exs. Austro-Hung. no. 1196, L, S), *G. Lagerheim*, 4 Oct. 1882 (as *G. compacta* in Witt. & Nordst., Alg. Exs. no. 596, FC, L, S); auf Leucodon bei Wien, ex herb. Grunow. (FH); in rupibus prope pagum Purkersdorf (in silva Wiener Wald), *K. de Keissler*, Mar. (as *G. sanguinea* in Mus. Vindob. Krypt. Exs. no. 2049, FC, L, S, Z); in rupibus vallis Krummbachgraben in monte Schneeberg, *G. de Beck*, Jul. (as *Aphanocapsa montana* in Mus. Vindob. Krypt. Exs. no. 146b, FC, L, NY, S); auf Holz in einem Brunn in Neehaus, *A. Grunow*, Aug. 1858 (Type of *Aphanocapsa violacea* Grun., W). Styria: Hortus Sackeli, Graz, *A. Hansgirk*, Sept. 1890 (FC, W); "äussere Wand der Wasserarche" prope Mürrzuschlag, *F. Pfeiffer & Schmula* (as *Gloeocapsa nigrescens* in Fl. Exs. Austro-Hung. no. 3198, FC, FH, L, MO, S, Z). Salzburg: in cortice arborum ad torrentes Gollinger Wasserfall, *C. de Keissler*, Jun. (as *G. alpina* in Mus. Vindob. Krypt. Exs. no. 228b, FC, L, NY, S, Z); Gastein, *Diesing* (FH); ad saxa irrorata et humida prope Wildbad-Gastein, *G. de Beck*, Jun. (as *Aphanocapsa montana* in Mus. Vindob. Krypt. Exs. no. 146, FC, L, S). Carinthia: St. Veit-an-der-Glan, *Hansgirk*, Sept. 1889 (FC, W); Pontafel, *Hansgirk*, Aug. 1885 (FC, W); Kalk und Tuff am Kolbitsch, *H. Simmer* 1007, 29 Aug. 1898 (Type of *Chroococcus alpinus* Schmidle, Z; isotype, S); Kreuzeckgebiet, *Simmer*, Aug. 1898 (S), bei Rittersdorf, *Simmer*, Oct. 1898 (S), auf Zannhölzern, *Simmer* 1058, 29 Aug. 1898 (Z), am Knoten, *Simmer*, Aug. 1897 (S), in Ameisengraben, *Simmer* 1056, 14 Apr. 1898 (Z), bei Zwickenberg auf feuchtem Sande, *Simmer* 1059, 31 Aug. 1898 (Z). Tyrol: Brixlegg, *A. Hansgirk*, 1891 (FC, W); Hall, *Hansgirk*, 1891 (FC, W); zwischen Hall und St. Magdalene, *Hansgirk*, 1891 (FC, W); Rothholz nächst Jenbach, *Hansgirk*, 1891 (FC, W); Kufstein, *Hansgirk*, 1891 (FC, W); Thierberg, Hechtsee, etc. bei Kufstein, *Hansgirk*, 1891 (FC, W); feuchte Felsen an Langensee bei Kufstein, *Heusler*, Aug. 1860 (Type of *Gloeocapsa haematodes* var. *violascens* Grun., W [Fig. 70]); auf nassen Kalkfelsen bei Mühlau, *Kerner* (S).

JUGOSLAVIA: Slovenia: Bischoflack, *A. Hansgirk*, Aug. 1889 (FC, W); Brunndorf et Draga prope Laibach, *Hansgirk*, Sept. 1889 (FC, W); Franzdorf, *Hansgirk*, Aug. 1889 (FC, W); ex caverna (Jelenska Jerna), Franzdorf, *Hansgirk*, Aug. 1889 (FC, W); Marburg, *Hansgirk*, Aug. 1890 (FC, W); Podnart, *Hansgirk*, Aug. 1889 (FC, W); Tüffer, *Hansgirk*, Aug. 1890 (FC, W). Istria: in saxis calcareis ad fl. Quieto prope Pinguente, *Hansgirk*, 1891 (Type of *G. alpina* var. *mediterranea* Hansg., W; isotype, FC [Fig. 45]). Dalmatia: Cannosa—Valdinoco prope Ragusa, *Hansgirk*, 1891 (FC, W); Topla—Gruda prope Castelnuovo, *Hansgirk*, 1891 (FC, W); Lesina, herb. Kützing (L); St. Dominica, Lesina, 1857, herb. Kützing (L). TRIESTE: *F. Hauck*, Sept. 1874 (S); in saxis in ostio fluminis Quieto ad Cittanova, *Hansgirk*, 1891 (FC, W); Pirano, *Hansgirk*, Apr. 1889 (FC, W);

Pisino, *Hansgirk*, Aug. 1889 (FC, W); in saxis prope Prosecco—Miramar, *Hansgirk*, 1891 (FC, W); with *Scytonema crustaceum* Ag., Monte Spaccato, Triest, F. T. Kützing, Apr. 1835 (Type of *Gloeocapsa rosea* Kütz., L); Boschetto, Triest, F. Hauck, Mar. 1884 (L). ALBANIA: Radhima, acqua di una fonte, G. de Toni 65a, 16 Jun. 1941 (FC, DT); Fushes-Dukati, roccia bagnata presso una sorgente, de Toni 75, 23 Jun. 1941 (FC, DT), pendici del Shendellit, de Toni & L. Boldori 82, 6 Jul. 1941 (FC, DT). LIECHTENSTEIN: ad saxa calcarea supra Vaduz, G. de Beck (as *G. alpina* in Mus. Vindob. Krypt. Exs. no. 228, FC, L, NY, Z).

SWITZERLAND: an Felsen, Bodenhaus, Berner-Oberland, C. von Nägeli, 26 Jul. 1850 (ZT), an bespritzten Balken, with *Schizosiphon parietinus* var. *alpinus* Näg., von Nägeli, 20 Jul. 1850 (Type of *G. nigrescens* Näg., ZT); Bern, in herb. Kützing (Type of *G. atrata* Kütz., L; isotypes, FI, UC); an feuchten Felswänden, Engelberg, Kt. Unterwalden, C. Cramer, Jul. 1859 (Type of *G. alpina* Näg., FC [Fig. 17]); with *Scytonema incrustans* Kütz., Erlenbacher Tobel, auf Felsen, von Nägeli, Oct. 1850 (ZT); Moose überziehend, Gäbris, Appenzell, B. Wartmann, Jul. 1862 (as *Aphanocapsa montana* var. *micrococca* in Wartm. & Schenk, Schweiz. Krypt. no. (134), MIN, ZT); St. Gotthardsstrasse oberhalb Göschenen, Uri, Cramer, 4 Jul. 1862 (as *Gloeocapsa opaca* in Wartm. & Schenk, Schweiz. Krypt. no. 235, Z); im stehenden Wasser vom schmelzenden Schnee auf der Gemmi, Wallis, R. J. Shuttleworth 232, 22 Aug. 1841 (BM), 216, Aug. 1841 (BM); an Felsen, Maderanerthal, Uri, Cramer, Aug. 1876 (FC, FH); Maderanerthal along the Kerstelenbach, J. T. Koster 1297, 28 Jun. 1948 (FC); on roots of *Hedera helix*, Meride-Serpiano, Ticino, R. A. Maas Geesteranus 3403, 30 May 1946 (FC); rochers calcaires, Meride-Tremona, Tessino, Maas Geesteranus 3261, 2 Jun. 1946 (FC); Rigi, Cramer, Sept. 1856 (Type of *Aphanocapsa montana* and var. *micrococca* Cramer in Wartm. & Schenk, Schweiz. Krypt. no. 134, ZT; isotype, MIN); Schaffhausen, in herb. Kützing (Type of *Gloeocapsa scopulorum* Näg., L [Fig. 16]; isotypes bearing variant labels: "Rheinfall, von Nägeli, Jul. 1847", M, and "ad Rheni cataractam, Nägeli", FI); am Nagelfluhfelsen der Bernegg bei St. Gallen, Wartmann, 1858, 1861 (as *G. coracina* in Rabenh. Alg. no. 814, FC, L; as *G. coracina* in Wartm. & Schenk, Schweiz. Krypt. no. 35, Z), 21 Dec. 1858 (Type of *G. saxicola* Wartm. in Rabenh. Alg. no. 813, FC [Fig. 22]; isotypes, L, and in Wartm. & Schenk, Schweiz. Krypt. no. 345, Z); Trinser See auf Kalkfelsen, G. C. Brügger (Type of *Aphanocapsa montana* var. *macrococca* Cramer, ZT); ad *Populi pyramis* corticem, Zürich, G. Winter, Mar., Apr. 1877 (FC, L, M, S), Jul. 1878 (FC, S); ad terram arenosam humidam, Zürich, Winter, May 1878 (FC), Jan. 1879 (L); auf feuchtem Holz, Zürich, Nägeli 108 (Type of *Gloeocapsa versicolor* Näg., L [Fig. 50]; isotype, UC); an nassen Felsen, Zürich, Nägeli 216 (Type of *G. geminata* Kütz., L [Fig. 33]); Zürich, Nägeli 299 (Type of *G. ianthina* Näg., L [Fig. 23]; isotype, UC), Nägeli 301 (Type of *G. ambigua* Näg., var. *pellucida* Näg., and b. *violacea* Näg., L); an nassen Felsen, Küssnacher Tobel, Nägeli 302, Sept. 1847 (M); Zürich, Nägeli 304 (Type of *G. punctata* Näg., L; isotype, UC), Nägeli 364 (L), Nägeli 365 (Type of *G. ambigua* β *rivularis* Näg., L; isotype, UC), Nägeli 387 (Type of *G. opaca* Näg. and var. *pellucida* Näg., L; isotype, UC); an einem Felsen unten der Sihl, Zürich, von Nägeli, 27 Mai 1849 (ZT); an einem Brunnen bei Küssnacht unweit Zürich, Wartmann (as *G. nigrescens* in Rabenh. Alg. no. 629, FC, FH, L, TA).

ITALY: Venetia: Aquilegia, Bisioletto, 1850 (UC); Isonzo, A. Hansgirk, 1891 (FC, W); Görz, Hansgirk, 1891 (FC, W); Sagrado prope Görz, Hansgirk, 1891 (FC, W); Oliero, E. de Toni (DT); Conegliano, G. B. de Toni & D. Levi, 1887 (as *G. versicolor* in de Toni & Levi, Phyc. Ital. no. 85, UC; in Roumeguère, Alg. de Fr., L); Nostoc no. 2, Padova, Meneghini (Type of *Palmella didyma* Kütz., L; isotype, UC); S. Pietro in thermis Euganeis, O. Beccari (B); with *Coccochloris stagnina* Spreng., Abano, therm. Eugan., Meneghini (Type of *Gloeocapsa cryptococcoides* Kütz., L; isotypes, UC, S); Battaglia, Meneghini (Type of *Protococcus pygmaeus* Kütz., L [Fig. 27]); ubique super muros Patavii, Meneghini (Type of *Pleurococcus communis* Menegh., FI [Fig. 83]; isotypes or cotypes with variant labels, "ad muros humidus", PC, and "ad parietes humidus", W, FI); ad muscos ad rupes in udis [Euganeorum], S. Elena, Meneghini, Sept. 1837 (Type of *Coccochloris muscicola* Menegh., FI [Fig. 79]; isotypes, L, UC); in Euganeis, Meneghini (Type of *C. parietina* Menegh., FI [Fig. 77]; isotypes, L, PC); in thermis Euganeis, Meneghini (Type of *Anacystis marginata* Menegh., L [Fig. 19]; isotypes, FC, B, S), in Euganeis, Meneghini (Type of *Microcystis nigra* Menegh., FI [Fig. 64]; isotypes, L, LD, S, UC); in rupibus humidis in mont. eugan., Titius, 1853 (Type of *Gloeocapsa Titiana* Grun., W); Sterzing—Gossensass, Hansgirk, 1891 (FC, W); Ala, Hansgirk, 1891 (FC, W); S. Margarita prope Ala, Hansgirk, 1891 (FC, W); Auer, Hansgirk, 1891 (FC, W); Gossensass—Pfersch, Hansgirk, 1891 (FC, W); Kardaun—Blumau prope Bozen, Hansgirk, 1891 (FC, W). Lombardy: Bormio, su rupi umide presso la sorgente Pliniana, E. Levier, Aug. 1871 (as *Gloeocapsa rupestris* in Erb. Critt. Ital., Ser. II, no. 663, FC, L); in muris humidis, Bellagio, N. & G. Lagerheim, 17 Sept. 1882 (D, S). Piedmont: su muschi rupicoli lungo i torrenti di Val Intrasca al Lago Maggiore, De Notaris, Aug. 1865 (as *G. livida* in Erb. Critt. Ital., Ser. II, no. 340, UC). Liguria: ad Oleam vetustam, Varigotti, C. Sbarbaro, 28 Mar. 1950 (FC); ad rupes inter Porto Venere et Spezia, U. Martelli, Nov. 1890 (DT). Emilia: Ballata Bagnatori prope Bologna, C. Zanfrognini, Aug. 1896 (DT). Tuscany: sulla scorza del *Diospyros virginiana* nell'Orto Botanico Pisano, Archangeli, Jan. 1883 (as *Gloeocapsa versicolor* in Erb. Critt. Ital., Ser. II, no. 1323, FC); Firenze (FH), sulla corteccia dei cipressi al Giardino di Boboli, G. Archangeli, Jan. 1878 (as *G. livida* in Erb. Critt. Ital., Ser. II, no.

664, FC, L, NY, UC, Z); Vallombrosa, *A. Borzi* (FH), comm. F. Ardissoni (NY); sui muri umidi di un ponte presso Vallombrosa, *Borzi*, Oct. 1878 (as *Aphanocapsa pulchra* in Erb. Critt. Ital., Ser. II, no. 784, FC, NY, S). Roma: Roma, *E. Fiorini-Manzatti* (PC). Campania: amphitheater, Pozzuoli, *B. M. Davis*, May 1904 (MICH). Apulia: serra di Otranto, in herb. Kützing (L).

FAEROES ISLANDS: Faeroa, *Lyngbye*, as *Palmella alpicola* (FC, MO). **SCOTLAND:** "Palmella frutulosa Car." [Appin?], *Carmichael* (Type of *Haematococcus frutulosus* Harv., K [Fig. 38]; isotype?, "ex herb. Thwaites", BM); "Palmella livida C." [Appin?], *Carmichael* (Type of *Palmella livida* Carm., K [Fig. 65]); "Palmella aeruginosa Car." [Appin], *Carmichael* (Type of *Haematococcus aeruginosus* Hass., K [Fig. 84]); Isle of Skye, *Lightfoot* (Type of *Ulva montana* Lightf., K); summit of Ben Arthur, *Arroquhar, W. Borrer* (BM). **ENGLAND:** Cantley, Yorkshire, *W. West*, Aug. 1887 (Type of *Chroococcus schizodermaticus* West, BIRM); Brant Fell, English Lake District, *G. S. West*, Aug. 1891 (UC); wet limestone rocks, Helin Pt., west Yorkshire, *G. S. West*, May 1897 (UC); Linn Gill, west Yorkshire, 12 Apr. 1895 (FC, UC); in river at Fairford, Gloucestershire, *W. L. Tolstead* 8496, 3 Oct. 1944 (FC); Upper Pen pond, Richmond Park, Surrey, *J. W. G. Lund* (Type of *Coelosphaerium limnicola* Lund in the private collection of *J. W. G. Lund*; isotype D [Fig. 76]). **WALES:** Llyn Teyrn, Snowdon, *G. S. West*, Aug. 1891 (Type of *Aphanosyce saxicola* var. *sphaerica* W. & G. S. West, BIRM [Fig. 55]); Dolgelley, *J. Ralls* (Type of *Palmella Rallsii* Harv., BM; isotypes with variant label, "Welsh Mountains", L, UC). **IRELAND:** Ballintay, *D. Moore* (K); cavy white rocks, Portrush, county Antrim (FC, L); M. Ben Gower, *Shuttleworth* 65 (Type of *Gloeococcus Shuttleworthiana* Kütz., L [Fig. 37]; isotype, C); wet rocks, Erigal, county Donegal, *G. Dickie*, Jul. 1852 (designated as Type of *Haematococcus binalis* Hass., BM). **NETHERLANDS:** Nieuwkoopse plas, *J. T. Koster* 562, Jun. 1940 (L); on wall in hothouse, Hortus Botanicus, Leiden, *Koster* 220, 5 May 1938 (FC, S), *Koster* 856, Nov. 1943 (L); in a small cement trench, hothouse, Hortus Botanicus, Leiden, *P. Leenhouts*, 12 Oct. 1950 (FC); tegen rotswanden, Valkenburg, *W. F. R. Suringar*, Jul. 1861 (L).

FRANCE: ad parietes cryptarum (as *Pleurococcus bituminosus* in Rabenh. Alg. no. 2188, L). Aisne: sur les casemates, Berthenicourt-par-Moy, *J. Mabilie* 1, 3, May 1952 (FC). Alpes Maritimes: Antibes, *G. Thuret*, 9 Feb. 1869 (FH, L), 31 Jan. 1869 (PC), 9 Mar. 1870 (FC, NY), 21 Mar. 1870 (FC); grottes de Menton, *C. Flabault*, Apr. 1882 (PC), Aug. 1882 (S); rochers de la Croupelastière, *E. Bornet*, 20 Jan. 1872 (PC). Alsace: stagnes d'eau saumâtre, environs de Strasbourg, *C. Roumeguère* (as *Chroococcus varius* in Roumeguère, Alg. de Fr. no. 507, L). Ardennes: sur rocher humide, Monthermé, *J. Mabilie*, 1952 (FC). Ariège: *H. Filhol* (as "Gloeosapsa rufescens" in Roumeguère, Alg. de Fr. no. 517, L). Bouches du Rhone: Marseille, falaises d'Arene, *Thuret*, Nov. 1854 (PC). Calvados: Falaise, *A. de Brébisson* (D, FC, FH, L, NY, S, UC, ZT), 557 (L, UC), 815 (L), 979 (L), sur les rochers humides (Type of *Protococcus magma* Bréb. in Desmaz., Pl. Crypt. de Fr. no. 213, L; isotype, FC); Falaise, *de Brébisson* (as *Gloeocapsa livida* in Desmaz., Pl. Crypt. de Fr. no. 1957, K, NY; in Rabenh. Alg. no. 2029, FC, K, L, UC); rochers granitiques et humides, *Brébisson* 172 (Type of *G. rupestris* Kütz., L); Falaise, *A. de Brébisson* (Type of *G. rupestris* Kütz. ex Wille, L; isotype, S); à St. Auberc, *de Brébisson* (as *G. rupestris* in Rabenh. Alg. no. 2030, FC, FH, L, NY); sur les rochers inondés, Falaise, *de Brébisson* (as *G. pellucida* in Roumeguère, Alg. de Fr. no. 410, L); Bayeux, *de Brébisson* 483, Sept. 1861 (L, UC); Vire, herb. Lenormand (Type of *G. compacta* Kütz., L [Fig. 49]; isotype, UC); sur un mur humide, Vire, *P. Frémy* 663, Jun. 1923 (NY). Cher: carrières calcaires, Bourges, *C. Ripart* 631, Jun. 1877 (S). Gironde: sur les pierres d'un fontaine à Cerons, *Durieu de Maisonneuve* (as *G. rupestris* in Roumeguère, Alg. de Fr. no. 956, L). Haute Garonne: sur les rochers de Luchon, *C. Fourcade*, 1886 (as *G. ambigua* f. *pellucida* in Roumeguère, Alg. de Fr. no. 825, L, TA). Hautes Pyrénées: sur rocher suintant, Cirque de Gavarnie, *J. Mabilie*, Sept. 1951 (FC); roches inondées au dessus de Cautejets, *Lamy de la Chapelle* (as *G. ianthina* in Roumeguère, Alg. de Fr. 826, L, TA). Hérault: jardin botanique de Montpellier, *G. Lagerheim*, 1893 (S). Landes: Dax, muraille au nord du bassin émergé, *A. de Flers*, 16 Nov. 1886 (PC). Loire Inférieure: in fissuris rupium prope mare, Le Croisic, *E. Bornet*, 11 May 1877 (PC). Manche: Lepay, *A. de Brébisson* (FC, NY); rochers du Boule, *G. Thuret*, 5 Jan. 1853 (FH, S), *E. Bornet*, Jul. 1874 (FH, N); Cherbourg, *Thuret*, 5 Jan. 1853 (FC); mûr de l'église de St. Pierre de Sémilly, *P. Frémy* 688, Oct. 1923 (NY); St. Lo, mûrs, *Frémy* 320, Feb. 1931 (NY), Mar. 1924 (NY); La Meauffe, sur rochers calcaires, *Frémy*, Mar. 1933 (NY); carrières de La Meauffe, *Frémy*, Mar. 1925 (NY). Orne: Domfront, *A. de Brébisson* (Type of *Protococcus haematodes* Kütz., L [Fig. 88]; isotypes, S, and as *Gloeocapsa haematodes* in Rabenh. Alg. no. 2192, L, S). Seine: écorce de *Populus tremula*, Paris, *Brébisson* 452 (Type of *G. violacea* Kütz., L [Fig. 42]; isotypes, S, UC, and as *G. lignicola* in Rabenh. Alg. no. 2031, FC, L, NY, S, UC). Seine et Marne: in aquario ad Reuilly, *G. Thuret*, Jan. 1849 (FH, L, NY; as *Aphanocapsa parietina* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1547, L, NY); Ferrières, sur *Populus alba*, Versailles, *E. Bornet*, 6 Apr. 1850 (Type of *Gloeocapsa Itzigsohnii* Born., FH); La Ferré-Alais, *Thuret*, Jun. 1852 (NY). Seine Inférieure: mûr humide, Le Havre, *Dupray*, Jan. 1887 (as *G. aeruginosa* in Roumeguère, Alg. de Fr. no. 824, K, L). Vosges: étang des Moines, Remiremont, *E. Demangeon* (as *G. magma* in Roumeguère, Alg. de Fr. no. 114, L); Jardin Gremille à Remiremont, *Demangeon*, Jan. 1852 (as *Chroococcus fusco-ater* in Roumeguère, Alg. de Fr. no. 264, L); Vosges, ex herb. Lenormand (DT, FH, L, NY); in locis campestribus etc. (as *Collema scotinum* in Moug. &

Nestl., Stirp. Crypt. Vogeso-Rhen. no. 637, FC); ad saxa granitosa quartzosaeque Vagesorum (as *Gloeocapsa magma* in Moug. & Nestl., Stirp. Crypt. Vogeso-Rhen. no. 1291, TA). Yonne: rochers de Pontigny, Brébisson, Jan. 1852 (FC).

FRENCH SUDAN: Bamako, M. Serpette SU6, Aug. 1953 (D). UGANDA: in Lake Albert Nyanza, R. T. Leiper, July 1907 (Type of *Microcystis densa* G. S. West in slide collection, BIRM). TANGANYIKA: Amani, an Kalkwänden eines alten Gewächshauses bei den Saatbeeten, B. Schröder 19b, Aug. 1910 (S). RUANDA URUNDI: Usumbura, bei Kwambugu an Baumrinden in den Hochwäldern, Holst 1436, Sept. 1892 (Type of *Gloeocapsa Holstii* Hieron. in slide collection of N. Wille, O). MOZAMBIQUE: Marramwe lake, E. L. Stephens 36, 14 June 1928 (D). ANGOLA: Golungo Alto, ad saxa juxta cataractam riv. Congo prope Sange, F. Welwitsch 134, Sept. 1856 (FC, UC). ALGERIA: Amoureh, F. Debray, May 1891 (NY); a Calabona, stillicidii d'acqua calcarifera (as *G. atrata* with *Schizosiphon crustiformis* in Marcucci, Un. Itin. Crypt. no. XXIIIa, FC). CANARY ISLANDS: Funchal, C. Lindman, 7 Jan. 1885 (D, S). AZORES: ad pumices pr. Furnas ins. San Miguel, K. Boblin, Jul. 1898 (as *Gloeocapsa magma* in Wittm., Nordst., & Lagerh., Alg. Exs. no. 1612, L). BERMUDA: causeway between St. David's island and Hamilton island, A. J. Bernatowicz 51-826, 31 Jan. 1951 (FC); on flat rock near Hungry bay, F. S. Collins 23, 3 Apr. 1912 (as *G. fusco-lutea* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2153, D, FC, L); on inland cliff near Hillcrest, Collins, 15 Aug. 1913 (as *G. atrata* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2152, D, FC, L). GREENLAND: Maligiak, T. M. Fries, Jul. 1871 (S); Danmarks ø, N. Hariz, Mar. 1892 (FH).

NOVA SCOTIA: on littoral rocks, St. Margaret's Bay, Halifax county, T. A. & A. Stephenson NSM9b, Jul.—Sept. 1948 (FC). NEW BRUNSWICK: on ledges and rocks, Grand Falls, Victoria county, H. Habeeb 10057, 10283, 10314, 10456, 10556, 10558, 10580, 10586, 10646, 10652, 10687, 10696, 10704, 10741, 10746, 13341, 13434, 13452, Jul. 1947—Sept. 1948 (FC, HA); twig in lake 8 miles south of Grand Falls, Habeeb 11651, 22 June 1951 (FC, HA); on concrete tub at a spring, mouth of Salmon river, Victoria county, Habeeb 11673, 11674, 24 June 1951 (FC, HA); ledge-pool at falls, Pokiok, York county, Habeeb 11581, 11582, 6 June 1950 (FC, HA); on ledge, Point Wolf, Albert county, Habeeb 11683, 26 July 1951 (FC, HA); Island lake, 40—50 miles due south of Dalhousie (in Northumberland county?), M. Le Mesurier 4, Aug. 1953 (FC). MAINE: Canton Point, Oxford county, Parlin, May 1935 (NY); Round Pond, Lincoln county, F. S. Collins 4118, July 1901 (NY); on rocks above high water-mark, Cape Rosier, Collins, July 1900 (FH); as *Entophysalis magnoliae* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1802, FC, L, MIN, TA, UC); in a pond, Hollis, York county, R. M. Whelden, 31 Aug. 1929 (D); sink hole, Hollis, F. C. Seymour, 11 Sept. 1938 (FC); edge of Basin pond, Mt. Katahdin, B. M. Davis 7, 1902 (FC, MICH). NEW HAMPSHIRE: Jackson, S. Higginson, 1888 (FC); at the Flume, W. G. Farlow, Sept. 1882 (FH), 1901 (MICH); top of Page hill, Chocorua, Farlow, Sept. 1909 (FH); Acworth, Sullivan county, B. M. Davis, 1903 (MICH). VERMONT: Ripton gorge, Addison county, W. G. Farlow, Sept. 1896 (FC, S).

MASSACHUSETTS: Magnolia, W. G. Farlow, Aug. 1877 (Type of *Entophysalis magnoliae* Farl., FH; isotype, PC); path, Fells station, Melrose, F. S. Collins 2503, Apr. 1893 (NY); on perpendicular wet rock, Middlesex Fells, Collins, 9 June 1895 (as *Gloeocapsa magma* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 151, FC, L, MICH, TA), Collins 2565, May 1893 (NY); Siasconset, Nantucket, Collins 3394, 23 Aug. 1896 (FH, NY); Nobsca pond, Woods Hole, W. Trolese, 1881 (MO); Saugus, Collins 1279, Apr. 1890 (NY); Marblehead, Collins 1296, Apr. 1889 (NY); Chelmsford, Russell (FC); on walls of greenhouse, Botanic Garden, Cambridge, Collins 3582, 12 Jan. 1899 (FC, UC); as *Chroococcus varius* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1202, FC, D, L, TA); Juniper point, Salem, Collins, 11 Aug. 1889 (FC, UC); South Quincy, F. C. Seymour, 3 Jul. 1943 (FC); on dripping Masonry under railroad bridge, Melrose, Collins, 9 Aug. 1902 (as *Gloeocapsa ianthina* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1205, FC, L, TA). RHODE ISLAND: limerock quarry, Lincoln, Collins 5437, 19 Apr. 1906 (FC, UC). CONNECTICUT: abutment, Factory pond dam, Bridgeport, I. Holden 642, 19 Jul. 1892 (UC), Holden 776, 15 Dec. 1892 (UC); Sage's ravine, Bridgeport, Holden 1052, 14 Oct. 1894 (FC, UC), Salisbury, Holden 699, 22 Aug. 1892 (FC, UC); moist limestone, Gaylordsville, Holden, 30 Oct. 1898 (as *G. violacea* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 551, FC, L, TA); on rocks, Round pond, Lantern Hill, North Stonington, W. A. Setchell 560, 13 Sept. 1892 (FC, UC); Sperry's falls, Sargents river, Woodbridge, Setchell 911, 21 Oct. 1894 (FC, UC), Setchell, 7 Nov. 1891 (FC, UC).

ARCTIC ARCHIPELAGO: Cornwallis island, J. Michéa 1, 1949 (FC); in rock pools, Koojesse inlet near Sylvia Grinnell river, upper Frobisher bay, Baffin island, H. A. Senn 3641a, 29 June 1948 (FC). LABRADOR: sur un rocher de la toundra, sur le ruisseau Nakvak, Monts Torngat, J. Rousseau 1096, 1—2 Aug. 1951 (FC). QUEBEC: fond d'un ruisseau, embouchure de la Korok, Baie d'Ungava, Rousseau 483, 22 Jul. 1951 (FC); fond de l'étang, au pied de Saglé, fourche de la Korok, Rousseau 996, 31 Jul. 1951 (FC); petite source tourbeuse, plateau au voisinage du Mt. Pyramid (57° 30' lat. N), Rousseau 823, 5 Aug. 1947 (FC); fond d'un lac, et sur rocher humide, embouchure de la Kogaluk, baie d'Hudson, Rousseau 209—211, 16 Jul. 1948 (FC); dans une tjaele et blocs de quartz, Baie Kayak (dans l'estuaire de la baie Payne),

Rousseau 1513, 1514, 19 Aug. 1948 (FC); sur un "ventre de boeuf" argilleux, portage entre le lac Tashwak et le lac Payne (entre la baie d'Hudson et la baie d'Ungava), *Rousseau* 785, 1 Aug. 1948 (FC); roche moutonnée, rivière Payne vers 70° 25' long. O., *Rousseau* 1134, 11 Aug. 1948 (FC); on rock in a small lake, table-top of Mt. Albert, Gaspé, H. Habeeb 1792, 28 Jun. 1951 (FC, HA); on wet rocks inside a cave, Ilet au Massacre, Le Bic, *Rousseau* 27015, 24 Aug. 1927 (FC); sur les rochers, carrière d'Outremont, Mont Royal près Montréal, C. Lanouette 100, 110, 123, Sept., Nov., 1940 (FC); carrière abandonnée, St. Vincent de Paul, *Lanouette* & R. Barabé 119, 3 Oct. 1940 (FC); Aqueduc lake, Rolland, Montcalm county, P. Giraudon J179.2, 15 Jul. 1949 (FC); dans une petite caverne à l'embouchure du rivière Saguenay, T. L. Doré, Aug. 1949 (FC).

NEW YORK: Au Sable Chasm, Clinton county, C. J. Sprague, Aug. 1880 (FH); Niagara, F. Wolle, Oct. 1876 (FH); Kullum pond north of Warrensburg, Warren county, J. Bader 174, 4 Aug. 1938 (FC); walls of gorge below fall, Rensselaerville, M. S. Markle 16, 28 Jul. 1946 (FC); greenhouse, Barnard College, New York city, H. C. Bold B20, B21, B24, Feb. 1941 (FC).

NEW JERSEY: Gardner's pond near Andover, Sussex county, E. T. Moul 7512, 16 Oct. 1952 (FC); on rocks in spray from a spring, Towaco, Morris county, F. Drouet & J. Kells 2067, 17 Jun. 1937 (D).

PENNSYLVANIA: dripping rocks, Lehigh valley, F. Wolle (D, PENN, S); Glen Onoko, Carbon county, Wolle, Oct. 1875 (D, PENN); Bethlehem, an nassen Felswänden, Wolle (as *Gloeocapsa Itzigsohni* in Rabenh. Alg. no. 3529, FC, L, TA, UC); culture, University of Pennsylvania, Philadelphia, W. A. Cassel 14, 15, 14 Dec. 1951 (FC); on a wet brick wall, North Warren, T. Flanagan 70, 19 Jul. 1943 (FC); wet face of a dam along Cresheim creek, Fairmount park, Philadelphia, Drouet & C. Hodge 3892, 20 Jul. 1941 (FC); upper falls, Buck Hill Falls, Monroe county, B. M. Davis, 18 Jul. 1915 (FC, MICH).

DELAWARE: pond in the dunes one mile south of Point Henlopen, north of Rehoboth Beach, Drouet & H. B. Louderback 8522, 8565, 8575, Aug. 1948 (FC). MARYLAND: limestone cliff, Swallow falls of Deep creek, Garrett county, L. P. McCann, M. W. Woods, D. S. Stoddard, & Drouet 2334, 29 Aug. 1938 (D); shallow water of the abandoned Chesapeake & Ohio canal, Cabin John, Montgomery county, Drouet, E. P. Killip, & D. Richards 5539, 6 Aug. 1944 (FC, US); pool in rocks, south shore of Plummers island in the Potomac river west of Cabin John, Drouet, Killip, & Richards 5555, 6 Aug. 1944 (FC, US).

VIRGINIA: rock, Bald Knob, Mountain Lake, Giles county, R. F. Smart 123, 31 Jul. 1938 (FC, ST); on concrete dam of Farrier's pond near Pembroke, Giles county, J. C. Strickland 515, 15 Aug. 1939 (FC, ST); wet cliff, summit of White Top mountain, Grayson county, Strickland 1072, 26 Aug. 1941 (FC, ST); limestone west of Dot, Lee county, Strickland & E. S. Luttrell 1361, 7 Aug. 1942 (FC, ST); dripping rock about 2 miles north of Pennington Gap, Lee county, Strickland & Luttrell 1347, 7 Aug. 1942 (FC, ST); on limestone about 5 miles north of Tazewell, Strickland & Luttrell 1272, 5 Aug. 1942 (FC, ST).

NORTH CAROLINA: on rocks etc., Highlands, Macon county, H. C. Bold 3a, H91c, H228, H231, H246, Jul. 1938, Jun. 1939 (FC); on rocks, Cullasaga Gorge, Macon county, Bold H159, 17 June 1939 (FC); stonework, Fort Macon, Beaufort, C. S. Nielsen & W. L. Culbertson 1745, 1746, 1751, 1754, 1755, 1757, 1758, 1770, 1772, 25 Aug. 1949 (FC, T); Dry falls on U.S. route 64, Pisgah national forest, Nielsen & Culbertson 1909 (FC, T); rocky cliff on state route 209 south of Hot Springs, Nielsen & Culbertson 1820, 1 Sept. 1949 (FC, T).

SOUTH CAROLINA: on wet cliffs, Easttoe river, Pickens county, Bold H262, Jul. 1939 (FC); on damp clay and on *Gleditschia triacanthos*, Aiken, H. W. Ravenel 548, 554, Dec. 1884 (FC).

GEORGIA: on abrk of *Maclura aurantiaca*, Savannah, Ravenel 1 (FH); on rocks, Tallulah Gorge, Rabun county, Bold 295a, 5 July 1939 (FC).

FLORIDA: on *Taxodium distichum* and other trees and on logs, Gainesville, Alachua county, Ravenel 9 (FH), 15, (FH), 18 (FH, UC), 34 (UC); Gainesville, M. A. Brannon 100, 325, Aug. 1942, May 1948 (FC, PC); on soil in greenhouse, U. S. Forestry Station, Olustee, Baker county, Brannon 226, 1 May 1944 (FC, PC); stones in pine woods about five miles northwest of Beacon Hill, Bay county, F. Drouet & C. S. Nielsen 11630, 31 Jan. 1949 (FC, T); on sand above high tide-mark, St. Andrews bay at west end of Hathaway bridge, west of Panama City, Drouet & Nielsen 10930, 15 Jan. 1949 (FC, T); on an Australian pine tree south of South lake, Hollywood, Broward county, Drouet 10287, 29 Dec. 1948 (FC); Marco island, Collier county, P. C. Standley 92836, 14 Mar. 1946 (FC); Little Marco, O. Tollin, May 1886 (S); Flag pond about 2 miles east of Little Marco, Tollin, May 1886 (S); on cement wall 5 miles west of Goulds, Dade county, C. Jackson 1, 15 Jul. 1952 (FC, T); limestone, Aspalaga area, Gadsden county, M. H. Voith 6, 9, 3 Nov. 1950 (FC, T), Nielsen, G. C. Madsen, & D. Crowson 783, 12 Feb. 1949 (FC, T); on trees beside U. S. highway 90 four miles east of Quincy, Drouet, Nielsen, Madsen, & Crowson 10427, 4 Jan. 1949 (FC, T); Highlands county, P. C. Standley 92700, 15 Mar. 1946 (FC); wayside park one mile west of Cortondale, Jackson county, Nielsen & Madsen 851, 19 Feb. 1949 (FC, T); on limestone etc., Florida Caverns state park north of Marianna, Nielsen, Madsen, & Crowson 320, 31 Aug. 1948 (FC, T), Drouet, Nielsen, Madsen, & Crowson 10343, 10350, 10379, 10380, 10391, Jan. 1949 (FC, T); 2 miles south of Marianna, Nielsen, Madsen, & Crowson 336, Aug. 1948 (FC, T); Leesburg, Lake county, Brannon 330, 31 May 1948 (FC, PC); on trees, Hendry Creek, about 10 miles south of Fort Myers, Lee county, Standley 73196, 73239, Mar. 1940 (FC); Natural Well, Leon county, Nielsen 121, June 1948 (FC, T); Nymphaea lake on Meridian road 14 miles north of Tallahassee, Nielsen, Madsen, & Crowson 353, 31 Aug. 1948 (FC, T); on trees on the northwest

shore of Lake Iamonia, Leon county, *Drouet, H. Kurz, & Nielsen* 11308, 24 Jan. 1949 (FC, T); edge of river, Rock Bluff, Liberty county, *J. E. Harmon* 4, 4 Oct. 1950 (FC, T); plaster on stairway, Fort Jefferson, Garden key, Dry Tortugas, *W. R. Taylor* 318, Jul. 1924 (TA); on trees and cement walks, Palm Beach, *Drouet & H. B. Louderback* 10214, 10216, 24 Dec. 1948 (FC); on a sand dollar in the dunes, Pensacola Beach, *Drouet, Nielsen, Madsen, Crowson, & A. Pates* 10611, 8 Jan. 1949 (FC, T); on a tree beside St. Marks river, Newport, Wakulla county, *Drouet, Madsen, & Crowson* 10824, 13 Jan. 1949 (FC, T); Log Sulfur spring, Newport, *Nielsen* 249, 252, Aug. 1948 (FC, T); spillway dam at Phillips Pool, St. Marks Wildlife Refuge, Wakulla county, *Nielsen, Madsen, & Crowson* 484, 9 Oct. 1948 (FC, T); on a tree, Wakulla Springs, *Drouet, Madsen, & Crowson* 11499, 27 Jan. 1949 (FC, T); Chipley, Washington county, *Nielsen & Madsen* 866, 19 Feb. 1949 (FC, T).

OHIO: Adams county, *W. A. Daily* 294, 25 May 1940 (DA, FC); road beyond White's Mill, the Plains near Athens, *A. H. Blicke & M. Wright*, 10 Jul. 1941 (DA, FC); cement wall, greenhouse, Ohio State University, Columbus, *Daily & F. K. Daily* 260, 29 Dec. 1939 (DA, FC); wet stone wall under bridge near Addyston, Hamilton county, *L. Lillick & I. Lee* 705, 23 Sept. 1933 (DA, FC); stone wall, Eden Park reservoir, Cincinnati, *Daily* 408, 410, 3 Jul. 1940 (DA, FC); flower pot dish, Peterson's greenhouse, Cincinnati, *Daily* 438, 9 Jul. 1940 (DA, FC); pond in Arlington cemetery, Cincinnati, *Daily* 420, 5 Jul. 1940 (DA, FC); near Seven Caves, Highland county, *W. B. Cooke*, Aug. 1932 (DA, FC); rocks and cliffs, Seven Caves park, Paint, Highland county, *Daily & F. K. Daily* 313, 320, 321, 16 Jun. 1940 (DA, FC); on sandstone, Old Mans Cave state park, Hocking county, *Daily & F. K. Daily* 503, 504, 506—508, 517, 518, 520, 525, 526, 528, 529, 532, 540, 541, 545—547, 549, 555—557, 561, 27 Jul. 1940 (DA, FC); sandstone, Cantwell Cliff state park, *Daily & F. K. Daily* 683, 684, 687, 692, 699, 703, 31 Aug. 1940 (DA, FC), 708—710, 714, 1 Sept. 1940 (DA, FC); cliff at Ash Cave, Hocking county, *J. Wolfe*, 11 Oct. 1935 (DA, FC); on sandstone cliff, Rock Run, 3 miles northwest of Jackson, *Wolfe*, Nov. 1935 (DA, FC), *Cooke*, 1 May 1937 (DA, FC); cliff, White's Gulch, Jackson county, 2 May 1936, ex coll. Max Britton no. 33 (DA, FC); Kelly Isle quarry near Marblehead, Catawba island, Ottawa county, *Daily & F. K. Daily* 578, 584, 25 Jul. 1940 (DA, FC); limestone cliff, Gibraltar isle, Put-in-Bay, Ottawa county, *Daily & C. E. Taft* 665, 24 Jul. 1940 (DA, FC); stone in damp place in woodland near Apple Creek, Wayne county, *L. J. King* 2319, Aug. 1944 (EAR, FC).

KENTUCKY: on sandstone near Ohio river, Boone county, *Daily & J. A. Tucker* 352, 25 Jun. 1940 (DA, FC); Carter's caves, Carter county, *L. Walp*, Fall 1940 (FC), *D. Parker*, 16 May 1942 (FC, ST); on rock 4 miles east of Maysville, Mason county, *W. L. Culbertson* 545, Aug. 1950 (FC); on sandstone rocks, Natural Bridge state park, Powell county, *Daily & F. K. Daily* 275, 14 Apr. 1940 (DA, FC), 365, 368, 369, 373, 374, 379—381, 386, 386a, 388—391, 394, 397—400, 30 Jun. 1940 (DA, FC), *H. K. Phinney* 533, 537, 541, Apr., May, 1939 (FC, PHI), *J. H. Hoskins*, 1938 (DA, FC), *B. B. McInteer* 1026, 1 Sept. 1939 (DA, FC), *MacFarland* 1088, 10 Jul. 1940 (DA, FC); sandstone, railroad tunnel, Sky Bridge road near Nada, Powell county, *Daily & R. Kosanke* 841, 842, 6 Oct. 1940 (DA, FC); on wet moss, Cumberland Falls, Whitley county, *L. Lillick*, 5 May 1933 (DA, FC); sandstone overhang, Torrent, Wolfe county, *Daily, F. K. Daily, & Kosanke* 460, 467, 472, 474, 479, 481, 483, 490, 14 July 1940 (DA, FC); sandstone, Tight Holler, Pine Ridge, Wolfe county, *Daily, A. T. Cross & J. Tucker* 763, 764, 768, 769a—772, 774—776, 778, 779, 783, 784, 787, 788, 790, 798—801, 804—806, 808, 811, 812, 814—820, 822, 6 Sept. 1940 (DA, FC), *Daily* 839, 840, 840b, 844, 5 Oct. 1940 (DA, FC); *Daily & F. K. Daily* 848, 851—853, 25 May 1941 (DA, FC).

TENNESSEE: water tank, Scout Camp, Anderson county, *H. Silva* 2339, 25 Aug. 1950 (FC, TENN); rocks in spring, Valley Lake, Davidson county, *Silva* 1809, 20 Aug. 1949 (FC, TENN); Glen Echo Lake, Davidson county, *H. C. Bold* 3931, 19 Feb. 1939 (FC); concrete dam, Neuberts Springs, Knox county, *Silva* 1526, 1532, 20 Jul. 1949 (FC, TENN); fish pond at greenhouse, University of Tennessee, Knoxville, *Silva* 586, 5 Apr. 1947 (FC, TENN); limestone roof of Fosters Cave, Montgomery county, *Silva* 1402, 15 Jul. 1949 (FC, TENN); cliff near Rugby, Morgan county, *Silva* 1665, 6 Aug. 1949 (FC, TENN); rock in spray of fall, Centennial lake, Nashville, *Bold* 161, 14 Oct. 1938 (FC); Sprout's Spring, Obion county, *Silva* 1294, 12 Jul. 1949 (FC, TENN); wet rock, tunnel near Chimneys, Sevier county, *Silva* 454, 11 Jan. 1947 (FC, TENN); Little River trail, Sevier county, *Silva* 66, 18 Aug. 1941 (FC, TENN); Myrtle Point, Sevier county, *A. J. Sharp* 413, 4 Sept. 1941 (FC, TENN); rock wall, Greenbrier Cove, Sevier county, *H. H. Illis* 2009, 1 Oct. 1947 (FC, TENN); rocks and cliffs, Ramsey Cascades, Sevier county, *Bold* H332a, H349, H356, H359, 18 Jul. 1939 (FC), *Silva* 413, 2350a, 29 Dec. 1946, 9 Sept. 1950 (FC, TENN); concrete bridge, highway no. 70, Shelby county, *Silva* 1086, 30 June 1949 (FC, TENN); seepage on concrete basin, Union county, *Silva* 309, 1 Nov. 1946 (FC, TENN). ALABAMA: Fort Morgan, Baldwin county, *R. L. Caylor* 51-7, Aug. 1953 (FC); on retaining wall beside Water street between Eslava and New Jersey streets, Mobile, *Drouet & H. B. Louderback* 10108, 19 Dec. 1948 (FC). MICHIGAN: on damp rocks, Wishing spring, West Shore drive, Mackinac island, *H. K. Phinney* 472, 25 Jul. 1943 (FC, PHI); in artesian spring, east shore of Burt lake, Cheboygan county, *Phinney* 501, 29 June 1943 (FC, PHI).

INDIANA: on limestone, Scenic Falls, near Hartsville, Bartholomew county, *F. K. & W. A. Daily*

1042, 1044, 11 Oct. 1942 (DA, FC); cement wall of Lake Shaffer dam, Monticello, Carroll county, *Daily* 868, 29 July 1941 (DA FC); on limestone, Clifty Falls state park near Madison, Jefferson county, *Daily* & F. K. *Daily* 671, 672, 682, 4 Aug. 1940 (DA, FC); on limestone, Tunnel Mills, Vernon, Jennings county, F. K. & W. A. *Daily* 908, 909, 1113, 1753, 1754, 23 May 1942, 1 June 1947 (DA, FC); limestone, Muscatatuck state park, Vernon, Jennings county, F. K. & W. A. *Daily* 912, 1104, 1105, 23 May 1942 (DA, FC); limestone in quarry, North Vernon, Jennings county, F. K. & W. A. *Daily* 1109, 23 May 1942 (DA, FC); limestone along Sand creek 6 miles west of Zania, Jennings county, C. M. Palmer, F. K. & W. A. *Daily* 982, 24 May 1942 (DA, FC); in a sink hole pool, Lawrence county, Palmer 1331d, 2 Sept. 1932 (D); on sandstone along trail no. 1, Shades state park, Waveland, Montgomery county, F. K. & W. A. *Daily* 966, 968, 970, 974, 976, 6 Jun. 1942 (DA, FC); on shale and sandstone, Pine Hills, Montgomery county, F. K. & W. A. *Daily* 1443, 1444, 11 May 1946 (DA, FC); on limestone, cement, etc., McCormicks Creek state park, Owen county, F. K. & W. A. *Daily* 1787, 1794, 1800—1806, 1809—1811, 1819, 1821, 1829, 9—10 Aug. 1947 (DA, FC); on sandstone, Turkey Run state park, Parke county, F. K. & W. A. *Daily* 1400, 1413, 1417, 1419, 1420, 1426, 1440, 10—11 May 1946 (DA, FC), 1841, 1848, 15 Aug. 1947 (DA, FC), Drouet & D. Richards 2475, 2478, 2481, 2487, 2498, 15—16 Jun. 1939 (FC); sandstone cliff, Blue Wells Hollow 5 miles east of Cannelton, Perry county, W. Welch 8198, 11 Jul. 1937 (DA, FC); on limestone wall, quarry at St. Paul, Shelby county, F. K. & W. A. *Daily* 886, 31 Aug. 1941 (DA, FC); wall under N. W. Fifth street bridge, Richmond, L. J. King 2334, Aug. 1944 (EAR, FC); railroad tunnels, Richmond, King 61, 64, 76, 77, and s. n., Aug. 1940, Oct. 1941 (EAR, FC); sediment in edge of Lake Wehi, Wayne county, M. S. Markle & King 737, 7 Sept. 1942 (EAR, FC); in a spring near Thistlethwaites falls north of Richmond, King, 21 Mar. 1941 (EAR, FC).

WISCONSIN: laboratory cultures A and C, University of Wisconsin, Madison, R. Evans, 9 Dec. 1949, 6 June 1952 (FC); in a pool in limestone one mile east of Prairie du Chien, Crawford county, Drouet 5079 (FC). ILLINOIS: laboratory cultures, University of Chicago, Chicago, P. D. Voth, 16 Jan., 20 & 29 Mar., 31 Jul., 1 Aug., 15 Sept. 1941 (FC); on cement walks in greenhouse, University of Chicago, Voth, J. M. Beal, & Drouet 2371, 5 Oct. 1938 (FC); tanks in greenhouse, J. A. Steyermark, C. Shoop, & Drouet 2444, 30 Oct. 1938 (FC); on stone, Lake Shore park, Evanston, H. K. Phinney 387, 18 Sept. 1943 (FC, PHI); Starved Rock state park, La Salle county, L. J. King 383, 5 May 1941 (EAR, FC), Steyermark & P. C. Standley 40646, 4 Jul. 1941 (FC); plankton of Goose lake northwest of Quincy, T. C. Dorris 56, 18 Jul. 1950 (FC); Lake Glendale, Robbinsville recreational area in Shawnee national forest, Pope county, Phinney 1062, 1 Sept. 1944 (FC, PHI). MISSISSIPPI: on the trunk of a tree at west limits of Biloxi, Harrison county, Drouet 9995, 14 Dec. 1948 (FC). MINNESOTA: Gunflint, Cook county, B. Fink, July 1897 (UC); rocks of old dock, north arm of Lake Itasca, Clearwater county, H. F. Buell 462, 9 Jul. 1946 (FC); in sluggish stream, Minneapolis, J. E. Tilden, 10 Aug. 1894 (as *Palmella waeformis* in Tild., Amer. Alg. no. 49, FC); on limestone in a quarry by the greenhouses, University of Minnesota, Minneapolis, Drouet, E. C. Abbe, & J. W. Moore 4995, 5 Aug. 1943 (FC). IOWA: on shaded limestone, Fayette, B. Fink 7, 17 May 1906 (FC, UC); rocks in fish pond, Guttenberg, Clayton county, W. Kiener 21533, 15 Sept. 1946 (FC, KI). MISSOURI: in a salt spring, Chouteau Springs, Cooper county, Drouet & H. B. Louderback 5641b, 25 Aug. 1945 (FC); rocks in quarry, Hill park, Independence, Drouet 321, 25 Dec. 1928 (D); on limestone ledge by Mill creek north of Bigs Springs, Montgomery county, Drouet 726, 9 Nov. 1930 (D, FH); top of bluff along Muddy creek 3 miles east of Newland, Pettis county, C. Shoop 339, 4 Oct. 1938 (FC); in stream from Elk Lick springs 7 miles southwest of Nelson, Saline county, Shoop 400, 6 Oct. 1938 (FC); on walls at entrance to Jam-up Bluff 6 miles northwest of Montier, Shannon county, J. A. Steyermark 28843, 8 June 1941 (FC); ledges along White river 11½ miles southeast of Mincy, Taney county, Steyermark 40107b, 20 June 1941 (FC); moist shaded cliff, Blackwell, Washington county, C. Russell 19, May 1900 (FC, UC).

ARKANSAS: still pool, Warren, Bradley county, D. Demaree 24813, 23 Oct. 1943 (FC); in a shaded bayou, Wilmar, Drew county, Demaree 24755, 9 Oct. 1943 (FC); on rock, Hot Springs mountain, Garland county, N. E. Gray 131, 18 Aug. 1939 (FC). LOUISIANA: on trunk of tree near Loranges, Tangipahoa parish, L. H. Flint, 21 Mar. 1953 (FC); on an epiphytic orchid, Varnado, Washington parish, Flint, 24 Jan. 1953 (FC); on trees east of Lacombe, St. Tammany parish, Drouet & Flint 9557, 2 Dec. 1948 (FC); on a tree beside Bayou du Large just north of Theriot, Drouet 9308a, 22 Nov. 1948 (FC); on the bank of the Intracoastal canal, Weeks Island, Iberia parish, R. P. Ehrhardt & Drouet 68, 15 Nov. 1948 (FC); on fence-posts, Grand Isle, Jefferson parish, Drouet & P. Viosca Jr. 9523, 27 Nov. 1948 (FC). MANITOBA: Fort Churchill, J. M. Gillett 2005, 2092, 18 June, 15 July 1948 (FC). SOUTH DAKOTA: on quartz about 20 miles southeast of Rapid City, Custer county, F. A. Hayes & B. H. Williams 12208, 8 May 1941 (FC, KI); in a watering tank 2½ miles south of Freeman, Hutchinson county, P. D. Voth, 2 Jul. 1945 (FC). NEBRASKA: culture from sandpit north of David City, Butler county, W. Kiener 22391b, 10 Nov. 1947 (FC, KI); shallow fishpond, Valentine, Cherry county, Kiener 23799, 18 Jun. 1948 (FC, KI); rocks, Chadron state park, Dawes county, Kiener 11534a, 20275, 26 Aug. 1941, 15 May 1946 (FC, KI); fishponds, Rock Creek Hatchery, Dundy county, Kiener 19557, 19558, 3 Aug. 1945 (FC, KI);

culture from seepage, Blue creek north of Oshkosh, Garden county, *Kiener* 16219, 21719a, 4 Nov. 1945, 28 Oct. 1947 (FC, KI); culture from a spring, Lonergan creek, Lemoyne, Keith county, *Kiener* 23068, 20 Aug. 1948 (FC, KI); on flower pot, University greenhouse, Lincoln, *Kiener* 10122, 13671—13674, 23 May 1941, 13 Mar. 1943 (FC, KI); culture from tank of farm well, Greta, Sarpy county, *Kiener* 12624e, 16 Jul. 1944 (FC, KI); pebble 2 miles southwest of Orella, Sioux county, *Kiener* 22192, 24 May 1947 (FC, KI); culture from Dismal river near Halsey, Thomas county, *Kiener* 16750c, 7 Oct. 1945 (FC, KI).

OKLAHOMA: under wet bluff, Turner Falls, Murray county, *A. J. Sharp* OA-413, 21 Dec. 1940 (FC, TENN). TEXAS: trail to Boot Springs, Brewster county, Chisos mountains, *E. Whitehouse* 24634, 23 Dec. 1950 (FC); on *Prosopis juliflora* DC. in woodland northeast of Resaca park, Brownsville, *R. Runyon* 3722, 30 May 1944 (FC). WYOMING: bottom of Trail's Divide and Brooklyn lakes, Medicine Bow national forest, *W. G. Solheim* 61, 114, 30 June, 17 July 1933 (FC). COLORADO: in a pond at 12,000 feet, Bald Mt., a few miles south of Pikes Peak, *H. L. Shantz*, 17 Sept. 1904 (Type of *Eucapsis alpina* Clem. & Shantz, US; isotype, D); on siliceous cliff, Chasm gorge, Longs Peak, *W. Kiener* 1277, 18 Sept. 1934 (FC, KI); Middle St. Vrain valley, Boulder county, *Kiener* 6245, 11 Oct. 1937 (FC, KI); South Colony creek, Custer county, *Kiener* 10392, 10394, 9 Jul. 1941 (FC, KI); granite rock, Lily mountain, Larimer county, *Kiener* 13171, 26 Sept. 1942 (FC, KI). NEW MEXICO: Carlsbad Caverns, Eddy county, *Bailey*, Apr. 1924 (NY), *W. B. Lang*, 1944 (FC); in a hot spring, Montezuma (Hot Springs), San Miguel county, *Drouet & D. Richards* 2534, 12 Oct. 1939 (FC); on wet ground near the city park, Hot Springs, Sierra county, *Drouet & Richards* 2713, 26 Oct. 1939 (FC); Little Tesuque, vicinity of Santa Fe, *Bro. G. Arsène* 23304, 6 Apr. 1937 (D). ALBERTA: Middle hot springs, Banff, *W. A. Seitchell*, 6 Aug. 1923 (FC, UC). UTAH: Zion canyon, Washington county, *N. E. Gray*, 13 Aug. 1941 (FC); in Quartzite falls, Mt. Timpanogos, Utah county, *A. O. Garrett* 56, 13 Aug. 1925 (FC, UC). ARIZONA: on rocks beside dam of pond in the Coyote mountains, 35 miles southwest of Tucson, Pima county, *Drouet, Richards, & R. & B. Darrow* 2757, 29 Oct. 1939 (FC); above falls in Emory canyon, Lake Mead, *E. U. Clover* 77a, 20 Apr. 1941 (FC, MICH). NEVADA: in water at 132° F., Wabuska, Lyon county, *I. La Rivers* 1800, 9 Jun. 1953 (FC); inside cold tank, Steamboat, Washoe county, *M. J. Groesbeck* 190, 375, 4 Sept. 1940, 3 Apr. 1941 (FC). YUKON: on *Hygrohypnum palustre* in a spring, Dawson, *R. S. Williams*, 30 Jul. 1899 (FC). ALASKA: Juneau, *D. Saunders*, Jun. 1899 (UC); Prince William sound, *Saunders* (FH); Akutan island, *G. N. Jones* 9397, Aug. 1936 (TA); pool in swamp, Glacier valley, Unalaska island, *Seitchell* 5023a, 7 Aug. 1899 (FC, UC); Mileposts 72, 83, 170 on Glenallen highway between Anchorage and Fairbanks, *D. E. Hilliard* 31, 45, 62, Sept. 1953 (FC). BRITISH COLUMBIA: Spillamacheen valley lakes near Bald mountain, Purcell range, Kootenay county, *W. R. Taylor*, Sept. 1925 (Type of *Aphanothece uliginosa* W. R. Taylor, TA); dripping rocks, Fish lake south of Beaver mouth, *Taylor* 14, 16, Sept. 1921 (TA); Cougar valley, Glacier, Kootenay county, *Taylor*, 1927 (TA). OREGON: in "hot springs" near Madras, Crook county, *L. E. Griffin*, 23 Apr. 1939 (FC).

CALIFORNIA: on a dripping water tank, Berkeley, *N. L. Gardner*, 20 Apr. 1894 (as *Synechocystis aquatilis* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1206, FC, L, TA), 26 Feb. 1906 (as *Aphanothece Richteriana* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1801, FC, L, TA); Berkeley, *Gardner* 637, Mar. 1902 (UC); on floor in the greenhouse, Department of Botany, University of California, Berkeley, *Gardner* 6807, 6938, 10 Sept., 28 Nov. 1931 (FC, UC); on damp boards in the agricultural greenhouse, University of California, Berkeley, *Gardner* 7428, 7429, 24 July 1933 (FC, UC); in an aquarium in the courtyard of the Life Sciences building, University of California, Berkeley, *Gardner* 7883, 3 Nov. 1935 (FC, UC); culture (of algae collected by H. E. Parks) in the University of California, Berkeley, *Gardner* 7819 (FC, UC); on trunk of bay tree, Strawberry creek, Berkeley, *Gardner*, 8 Mar. 1903 (as *A. conferta* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1152, FC, L, TA); culture (from Eureka, Humboldt county, collected by H. E. Parks), *Gardner* 6569, 7203, 12 Jan. 1931, 22 Apr. 1933 (FC, UC); on rock in steam and spray, the Geysers, Inyo county, *M. J. Groesbeck* 140, 6 Sept. 1940 (FC); in cold stream, Keough hot springs, Inyo county, *Groesbeck* 230, 23 Nov. 1940 (FC); about vent, Hot Creek Geysers, Inyo county, *Groesbeck* 418a, 7 Jul. 1941 (FC); first spring south of Triangle spring, Death Valley, Inyo county, *J. & H. W. Grinnell* 7625, 24 Oct. 1933 (FC, UC); fountain, Miller's Patio cafe, Long Beach, *E. C. Jennings*, 28 Feb. 1937 (D); Old El Encino hot springs, Los Angeles county, *B. C. Templeton* 1a, Jul. 1944 (FC); Lagunitas creek, Marin county, *V. Duran* 6604, Jan. 1931 (FC, UC); culture (from Almonte, Marin county, collected by H. E. Parks), *Gardner* 6906, 16 Oct. 1931 (FC, UC); in a cavern above high tide line, Mendocino City, *M. A. Howe*, 7 May 1896 (FC); stone in overflow of hot artesian well on north shore of Mono lake, *Groesbeck* 129, 6 Sept. 1940 (FC); Hot Creek Geysers, Mono county, *Groesbeck* 202, 418, 25 Nov. 1940, 7 Jul. 1940 (FC); Bridgeport, Mono county, *Groesbeck* 256, 331, 24 Nov. 1940, 3 Apr. 1941 (FC); pure cultures (one from A. Frenkel, another from Tassajara hot springs, Monterey county) at Hopkins Marine Station, Pacific Grove, *M. B. Allen*, 29 Jan. 1952 (FC); wall of reservoir, Del Monte, Monterey county, *W. J. V. Osterhout*, 13 Sept. 1902 (as *Aphanothece saxicola* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1203, FC, L); Calistoga, Napa county (*Gardner* no. 7832), *H. E. Parks* 3256 (FC, UC); in an urn, Mountain View cemetery, Oakland, *Gardner* 8020, 19 Jan. 1927

(FC, UC); on quartz, Mountain Spring Camp northeast of Essex, San Bernardino county, *Drouet & J. F. Macbride* 4609, 12 Oct. 1941 (FC); hot water creek in a canyon, Arrowhead hot springs, San Bernardino county (Gardner no. 7835), *Parks* 3250, Dec. 1929 (FC, UC); Waterman hot springs, San Bernardino county, *Setchell* 1554, 19 Dec. 1896 (FC, UC); on the trunk of a palm tree, Needles, *Drouet & Macbride* 4598, 12 Oct. 1941 (FC, UC); Mountain lake, San Francisco, *Gardner* 743, Sept. 1902 (UC); Lake Merced, San Francisco, *Gardner* 1583, Nov. 1905 (UC); in the conservatory, Golden Gate park, San Francisco, *Gardner* 7259, 7264, 3 May 1933 (FC, UC); on sand in a pond, Golden Gate park, San Francisco, *Gardner* 1121, 15 Jul. 1903 (FC, UC); on stones in Feldt lake, Stanford farm, San Mateo county, *Gardner* 3437, 2 Aug. 1916 (FC, UC); on rocks at entrance to ice caves on south side of Mt. Shasta, Siskiyou county, *W. B. Cooke* 16673, 2 Jul. 1942 (FC); in warm water, the Geysers, Sonoma county, *Gardner* 7524, 8 Aug. 1933 (FC, UC); in shallow water of Tule river, Porterville, Tulare county, *Drouet & Groesbeck* 4451, 4 Oct. 1941 (FC); culture (from Exeter, Tulare county, collected by H. E. Parks), *Gardner* 7786, 28 July 1935 (FC, UC).

BAHAMAS ISLANDS: New Providence, on bark, limestone, pipe of water tank, etc., *L. J. K. Brace* 197, 9624, 9684a, 9748, 9991, 10036(609), Oct.—Dec. 1918, Feb. 1919 (NY); on damp walls in a garden, Nassau, *Brace*, Dec. 1921 (NY); brackish marsh, rifle range, New Providence, *E. G. Britton* 3282, Feb. 1905 (NY); Moss Hill ponds, Long Cay, *Brace* 4235, Dec. 1905 (Type of *Chondrocystis Bracei* Howe, NY [Fig. 82]); freshwater lake off Stafford creek, Andros island, *A. D. Peggs*, 22 Aug. 1942 (FC). **PUERTO RICO:** on rocks, Arroyo de los Corchos, Adjuntas to Jayuya, *N. Wille* 1718, Mar. 1915 (Type of *Aphanocapsa intertexta* Gardn., NY [Fig. 32]; isotype, FH); bark, Aibonito to Cayey, *Wille* 1904, Mar. 1915 (NY); on rocks, etc., Arecibo to Hatillo, *Wille* 1155a, 1372b, 1387a (Type of *Anacystis nigropurpurea* Gardn., NY [Fig. 75]; isotype, FC), 1393 bis (NY); on rocks on walls in and near Arecibo, *Wille* 1337, 1363, 1368, 1457, Feb.—Mar. 1915 (NY); on limestone, Arecibo to Utuado, *Wille* 1465a (Type of *Gloeotheca endochromatica* Gardn., NY [Fig. 53]), 1476, 1476a, Mar. 1915 (NY); limestone between Cabo Rojo and San German, *Wille* 1194a, Feb. 1915 (Type of *Anacystis minutissima* Gardn., NY [Fig. 73]); on trees, walls, etc., Caguas, *Wille* 439 (Type of *A. compacta* Gardn., NY [Fig. 25]), 444 (FC, NY), 460c, 462 (NY), 462a (Type of *Endospora olivacea* Gardn., NY [Fig. 41]), Jan. 1915; on walls, rocks, trees, etc., Coamo Springs, *Wille* 254a, 273, 277, 278, 299a (Type of *Anacystis microsphaeria* Gardn., NY), 300 (Type of *A. irregularis* Gardn., NY), 300a, 300d, 301 (Type of *Chroococcus muralis* Gardn., NY [Fig. 26]), 303a, 304a, 307a, 308, 313, 321, 402b, 405, 1869e, 1869f (Type of *Anacystis radiata* var. *major* Gardn., NY [Fig. 51, 56]), 1870x, 1901a (Type of *A. radiata* Gardn., NY [Fig. 60]), 1901c, 1901d, 1905c, 1916a (Type of *Endospora rubra* Gardn., NY [Fig. 57]), 1923a, Jan., Mar. 1915 (NY); Pajardo, *Wille* 656 (NY), 679b, 712 (FC, UC), 713, 713a, (NY), 717a (D, NY), 719a, 719b, (FC, UC), 732a (NY), 732b (Type of *Anacystis anomala* Gardn., NY), 734a, 736a, Jan. 1915 (NY); on limestone, Coamo Springs, *N. L. & E. G. Britton* 9033, Mar. 1927 (NY); on bricks and bark, Guanica, *Wille* 1838, 1841a, Mar. 1915 (NY); on wood, stones, etc., Hacienda Catalina near Palmer, *Wille* 752, 755, (NY), 758 (FC, UC), 765 (NY), 768b (FC, UC), 791a (NY), Jan.—Feb. 1915; Hato Arriba near Arecibo, *Wille* 1397a, 1397b, 1399c, 1399d (NY), 1406a (Type of *Gloeocapsa livida* var. *minor* Gardn., NY [Fig. 52]), 1401b (Type of *Gloeotheca parvula* Gardn., NY [Fig. 35]), 1433 (Type of *Entophyalis violacea* Gardn., NY), Mar. 1915; on Flyteblok, Humacao, *Wille* 572a, 573b, 577a, Jan. 1915 (NY); on stones, Jayuya, *Wille* 1770a, c, d, Mar. 1915 (NY); an Kalkfelsen bei Guanica, *Wille* 1843, 17 Mar. 1915 (FC, UC); Laguna Joyuda, Mayaguez, *Wille* 1204, 1206 (FC, UC), 1207a (Type of *Anacystis nidulans* Gardn., NY [Fig. 62]), 1209a (Type of *A. Willei* Gardn., NY), 1210 (FC, UC), 1304 (Type of *A. gloeocapsoides* Gardn., NY [Fig. 44]), 1307a, 1316d, Feb. 1915 (NY); Laguna Tortuguero, *Wille* 835a (FC, UC), 866 (Type of *Gloeocapsa calcicola* Gardn., NY [Fig. 39]), 871, 872 (NY), Feb. 1915; Maricao, *Wille* 1050, 1061 (NY), 1135 (FC, UC), 1144e (Type of *Aphanotheca opalescens* Gardn., NY [Fig. 28]), 1148b,c (NY), 1151a,b (FC, UC), 1155e (Type of *Anacystis distans* Gardn., NY), 1155f, Feb. 1915 (NY); Mayaguez, *Wille* 981a,b, 982a,b, 985, 1000e (NY), 1012 (FC, UC), 1190, Feb. 1915 (NY); road to Monte Montoro, Maricao, *Wille* 1060, 1062, 1065d (NY), 1077e (Type of *Endospora bicoccus* Gardn., NY [Fig. 34]), 1073 (FC, UC), 1087 (NY), 1087a (Type of *Anacystis amplivesiculata* Gardn., NY [Fig. 20]), 1904 (Type of *A. pulchra* Gardn., NY [Fig. 63]), 1094a (NY), 1109 (FC, UC); by "Campo", Maricao, *N. L. Britton* 1290c, Feb. 1915 (Type of *Placoma Willei* Gardn., NY [Fig. 66]); on a concrete basin near the experiment station, Rio Piedras, *Wille* 177, Dec. 1914 (NY); on logs north of Sabana Grande, *Wille* 925, Feb. 1915 (Type of *Endospora nigra* Gardn., NY [Fig. 24]); on a church wall, Sabana Grande, *Wille* 953b, 956, 957, 961b,d, 962b,c, Feb. 1915 (NY); on wall, Governor's Palace, San Juan, *Wille* 58b, Dec. 1914 (NY); on walls near San Juan, *Wille* 66a, 92b, Dec. 1914 (NY); on a wall at Caleta de San Juan, *Wille* 66g, Dec. 1914 (NY); on walls, Fort San Cristobal, San Juan, *Wille* 1989c, 1991c, 1993, 1993a (NY), 1995 (FC, UC), 1998c, 1999, 2002, (NY), 2004 (FC, UC), 2004a,b,c, 2007, 2008, 2011, 2014c (NY), 2016a (Type of *Anacystis magnifica* Gardn., NY [Fig. 58]), 2019 (FC, UC), 2021, 2023a (NY), 2025 (FC, NY); Santurce, *Wille* 2 (NY), 2c (Type of *A. consociata* Gardn., NY), 3 (Type of *Chroococcus cubicus* Gardn., NY [Fig. 31]), 4a, 5 (NY), 38 (FC, UC), 56, 56j (NY), 141 (FC, UC), 142, 143a (NY), 149 (FC, UC), Dec. 1914; on bark at Utuado, *Wille* 1506a, Mar.

1915 (NY); on rocks and soil about 10 km. north of Uruado, Wille 1533a (Type of *Endospora mellea* Gardn., NY [Fig. 29]), 1553 (Type of *Anacystis nigroviolacea* Gardn., NY).

GUADELOUPE: Moule, grottes des falaises près le morne Aliard, Mazé & Schramm (Type of *Gloeocapsa tropica* Crouan, PC [Fig. 36]; isotype, K). ST. VINCENT: on damp wall of dam, Sharp's River, W. R. Elliott 477 (Type of *G. gigas* W. & G. S. West, with *Cosmariium pseudopyramdatum*, in slide collection, BM). DOMINICA: on lime trees, Shanford Estate, Elliott 901, Nov.—Dec. 1892 (Type of *Chroococcus minor* f. *minimus* W. & G. S. West, with *Hassallia byssoidea* (Berk.) Hass., FC; isotype, UC); on trees, summit of Trois Poitons, Elliott 903, 15 Nov. 1892 (Type of *Aphanocapsa elachista* W. & G. S. West, BIRM).

JAMAICA: rocks, Cascade river east of Cinchona, D. S. Johnson, Jul. 1919 (NY); Port Antonio, A. E. Wight (FC); on rocks, Arntully, C. R. Orcutt, 7 Nov. 1928 (FC, US); "decayed Macromitrium", Orcutt 5097 (BM, D); on wet rocks, I. F. Lewis, July 1906 (as *Gloeocapsa versicolor* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2203, FC, D; as *Microcystis marginata* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2204, FC). MEXICO: gorge below dam east of San Miguel de Allende, Guanajuato, M. C. Carlson 1344b, 17 Jan. 1949 (FC); caverns of Cacahuamilpa, Guerrero, G. O. Lee, Aug. 1938 (TA); rocks, Barranca de Oblatos, Guadalajara, W. Kiener 18199, 21 Dec. 1944 (FC, KI); house wall, Rio Primavera, Guadalajara, Kiener 18293, 18297, 18300, 27 Dec. 1944 (FC, KI); on a gravel bank 7 miles north of the village, Bahia Kino, Sonora, F. Drouet & D. Richards 2892, 9 Nov. 1939 (FC); crevices of cliffs in mountains on east side of Guaymas, Sonora, Drouet & Richards 3087a, 3 Dec. 1939 (FC).

GUATEMALA: Dept. Alta Verapaz: caves southwest of Lanquín, J. A. Steyermark 44084, 44085, 21 Feb. 1942 (FC); near Cobán, P. C. Standley 71763, Mar.—Apr. 1939 (FC); along Rio Carchá between Cobán and San Pedro Carchá, Standley 90008, Mar. 1941 (FC); wet cliff near Chirriacté on the Petén highway, Standley 91880, 9 Apr. 1941 (FC); on trunk of royal palm near Dolores, 1—2 miles northeast of Cubilguitz, Steyermark 44861, 8 Mar. 1942 (FC). Dept. Chiquimula: on cañon slopes on Socorro mountain southeast of Concepción de las Minas, Steyermark 31119a, 4 Nov. 1939 (FC). Dept. Huehuetenango: Rio Pucal about 14 km. south of Huehuetenango, Standley 82335, 4 Jan. 1941 (FC); on bark near crossing of Rio San Juan Ixtán east of San Rafael Pétzal, Standley 82952, 9 Jan. 1941 (FC); entrance to cave, summit of Sierra de los Cuchumatanes, Chémal, Steyermark 50256, 8 Aug. 1942 (FC); damp shaded bank north of Chiantla, Standley 82585, 6 Jan. 1941 (FC); Cerro Chémal, Steyermark 50304D, 8 Aug. 1942 (FC). Dept. Jalapa: rocks about 10 miles south of Jalapa, Steyermark 32201, 29 Nov. 1939 (FC). Dept. Sacatepéquez: on old bricks and on bark of *Bursera* near Antigua, Standley 58523a, 59832, Nov. 1938—Feb. 1939 (FC). Dept. San Marcos: on rock around thermal spring, Tajumulco, Steyermark 36873, 28 Feb. 1940 (FC); dry boulder just below summit of Volcán Tacaná, Steyermark 36117, 19 Feb. 1940 (FC). Dept. Santa Rosa: region of La Sepultura west of Chiquimulilla, Standley 79340, 5 Dec. 1940 (FC); on tree trunk, Guazacapán, Standley 78641, Nov.—Dec. 1940 (FC); on trees near Cuilapilla, Standley 78111, 78114, 23 Nov. 1940 (FC).

HONDURAS: Dept. Atlántida: on dead wood near Rio San Alejo south of San Alejo, Standley 7989, Apr. 1947 (FC). Dept. Comayagua: on plaster of urinal, Hotel Jerusalém, Comayagua, Standley 5780, Mar. 1947 (FC); on cliffs, Comayagua, Standley 5689, 5726, Mar. 1947 (FC); soil, sandstone, and fence rails, vicinity of Siguatepeque, Standley 5518, 6576, 6592, 6671, Mar.—Apr. 1947 (FC). Dept. Cortés: on *Citrus aurantiifolia*, vicinity of La Lima, Standley & J. Chacón P. 7112, Apr. 1947 (FC). Dept. El Paraíso: open sandy bank, Las Casitas, Standley, L. Williams, & P. Allen 581, 4 Dec. 1946 (FC). Dept. Morazán: on rocks and trees, El Zamorano, Standley 189, 215, 2171, 2365, 2396, Nov. 1946—Jan. 1947 (FC), 11708, Aug. 1947 (FC); on rocks, Quebrada de Santa Clara near Rio Yeguaré, Standley & L. O. Williams 1614, 17 Dec. 1946 (FC); on log, Agua Amarilla above El Zamorano, Standley & Williams 21, Nov. 1946 (FC); on old wood along Rio Yeguaré east of El Zamorano, Standley 1073, Dec. 1946 (FC). EL SALVADOR: on bark, San Vicente, Standley & E. Padilla V. 3519, Feb. 1947 (FC). NICARAGUA: on masonry and bark, Chichigalpa, dept. Chinangada, Standley 11461, 11536, July 1947 (FC); on tree trunks, Jinotepe, dept. Carazo, Standley 8453, 8494, 20 May 1947 (FC); on tree trunk, La Libertad, dept. Chontales, Standley 8854, May—Jun. 1947 (FC). COSTA RICA: Alrededores de San Ramón, A. M. Brenes 14937, 4 Jan. 1932 (FC); Cerro de la Muerte, 5 km. above Millsville, Cordillera de Talamanca, prov. Cartago, R. W. Holm & H. H. Illis 1005a, July 1949 (FC); U. S. Department of Agriculture Rubber Experiment Station, Los Diamantes on Rio Santa Clara, 1.6 km. east of Guapiles, prov. Limón, Holm & Illis 1021, 11 July 1949 (FC). PANAMA: on ponte ligneo oppidi Colon, G. Lagerheim, Dec. 1892 (as *Gloeocapsa magma* in Witttr., Nordst., & Lagerh., Alg. Exs. no. 1541a, L); in ancient grinding stone, Panama City, G. W. Prescott CZ19, Aug. 1939 (FC); Juan Mina, Chagres river (Canal Zone), H. H. Bartlett CZ198, Sept. 1944 (FC); moist lime bluff near Salamanca Hydrographic Station in the gorge of Rio Pequeni, C. W. Dodge, Steyermark, & P. H. Allen 16972, 16975, 14 Dec. 1934 (D, MO).

VENEZUELA: Amazonas: on igneous rock, Sanariapo, Steyermark 58509, Sept. 1944 (FC). Anzoátegui: limey bluff along Rio Zumbador northeast of Bergantín, Steyermark 61282, Mar. 1945 (FC); on shaded bluff, Fila Grande between Bergantín and Cerro Peonia, Steyermark 61550, 19 Mar. 1945 (FC); bluff between Cerro San José and Cerro Peonia, Steyermark 61567, 20 Mar.

1945 (FC). Bolívar: on face of bluff, Ptari-tepuí, *Steyermark* 59881, 6 Nov. 1944 (FC); on hematite outcrops, Sororopán-tepuí, *Steyermark* 60130, 15 Nov. 1944 (FC); on rocks, summit of Mt. Roraima, *Steyermark* 58820, 27 Sept. 1944 (FC). Dist. Federal: on concrete, house at Los Venados, *Steyermark* 55120, 2 Jan. 1944 (FC). Sucre: hot springs near La Toma southeast of Cumaná, *Steyermark* 62863, 21 May 1945 (FC). BRAZIL: Ceará: in seepage water at base of dunes, Urubú, Fortaleza, *Drouet* 1381, 24 Aug. 1935 (D); pool below dam, Açude Bôa Aqua, Quixadá, *Drouet* 1404, 2 Sept. 1935 (D); pools in Rio Pacotý 6 km. south of Aquiraz, *Drouet* 1453, 15 Oct. 1935 (D); Rio Pacotý 20 km. southeast of Meceriana, Pacatuba, *Drouet* 1456, 18 Oct. 1935 (D); roadside pool near Primavera, Soure, S. Wright, 28 Oct. 1937 (D). Parahyba: Açude Bodocongó near Campina Grande, *Wright* 1583, 6 Aug. 1934 (D). Pernambuco: wall along street below monastery, Olinda, *Drouet* 1267, 17 Jun. 1935 (D). Rio Grande do Sul: H. Kleerekoper 28, 1941 (FC). URUGUAY: in saxis, Punta Carretas, dept. Montevideo, G. Herter 840, Sept. 1947 (MO, UC). ECUADOR: Quito, G. Lagerheim, May 1892 (Isotypes of *Pleurocapsa muralis* Lagerh. in Witr. & Nordst., Alg. Exs. no. 1097, L, MIN, NY); Puente de Chimbo, Lagerheim, Aug. 1891 (S; as *Gloeocapsa magma* in Witr., Nordst., & Lagerh., Alg. Exs. no. 1541b, L); in rupibus madidis ad San Nicolas prov. Pichincha, Lagerheim, Oct. 1891 (with *Scytonema mirabile* in Witr., Nordst., & Lagerh., Alg. Exs. no. 1320, FC). PERU: on rocks and "sobre tierra", A. Maldonado, Jul. 1950, 1952 (FC); agua mineral, Arequipa, Maldonado 6, 10, 12, Jul. 1950 (FC). CHILE: fuktige bergvaggar vid Eberhard, Magellanes, O. Borge, Mar. 1899 (S).

HAWAIIAN ISLANDS: damp cliff at west end of beach, Kalalau valley, Kauai, W. J. Newhouse 1953-5, 2 Jan. 1953 (FC); mud, Kaali spring, Niihau, H. St. John 22837, 16 Aug. 1947 (FC); rocks, Rainbow falls near Hilo, Hawaii, W. A. Setchell 3210, 14 July 1900 (FC, UC); culture, University of Hawaii, Honolulu, M. Lohman 8134, Oct. 1951 (FC). MARSHALL ISLANDS: "mesa" island on ocean side of Jam-Wa, Arno atoll, L. Horwitz 9617, 19 Aug. 1951 (FC); palm on Jiland island, Arno atoll, Horwitz 9104, 17 Jul. 1951 (FC); Airukiraru island, Bikini atoll W. R. Taylor 46-244a, Apr. 1946 (FC, MICH); water hole behind the site of the village, Bikini island, Bikini atoll, Taylor 46-567, 3 Jul. 1946 (FC, MICH); crust on coral sand, Lae islet, Lae atoll, F. R. Fosberg 34007, 6 Jan. 1952 (FC, US); on Pandanus, Majuro island, Majuro atoll, A. Spoehr, May 1947 (FC); on coral rocks in woods, Burok island, Rongelap atoll, Taylor 46-599, 18 Jul. 1946 (FC, MICH); on coral boulders in scrub, Ujae islet, Ujae atoll, Fosberg 34420, 13 Mar. 1952 (FC, US); open sand in scrub, Kabben islet, Wotho atoll, Fosberg 34432, 19 Mar. 1952 (FC, US). TUAMOTU ISLANDS: Ngarumova, Raroia atoll, M. S. Doty & J. Newhouse 11257, 2 Jul. 1952 (FC). SOCIETY ISLANDS: with *Coccoloboris stagnina* Spreng., Tahiti, J. E. Tildem, Oct. 1909 (as *Aphanothece microspora* in So. Pacific Alg. no. 3, MIN). SAMOA: on dead Tridacne shells, Rose atoll, A. G. Mayor 1055, 6 June 1920 (Type of *Pleurocapsa Mayorii* Setch., UC; isotype, FC [Fig. 40]); an Felsen, Savaii, K. H. Rechinger 2834 (Type of *Gloeotheca samoensis* Wille in the slide collection, O); auf Baumrinde, Upolu, Rechinger 3621 (Type of *Gloeocapsa aeruginosa* f. *lignicola* Wille in the slide collection, O). GILBERT ISLANDS: fish-ponds on Nikunau, Mrs. R. Catala 5, 10, July. 1951 (FC).

NEW ZEALAND: terrestrial, Rangitoto island, Waitemata, V. J. Chapman, Sept. 1947 (FC); Rotorua, L. A. Doore & A. Nash, Feb. 1935 (as *Aphanocapsa thermalis* in Tild., So. Pacific Pl., 2nd Ser., no. 545, FC); hot springs, Tokano, S. Berggren 195, 199, 1878 (S); Rotorua, Ohinemuru, Capra A. B, Mar. 1909 (DT); cooking pool, native block, Ohinemutu, Rotorua, L. M. & M. H. Jones, 10 Feb. 1935 (Tild., So. Pacific Pl., 2nd Ser., no. 574, FC); in cold water, Great Geyser, and in steam, edge of Crystal Pool, Wairakei geyser valley, Taupo county, W. A. Setchell 5962 (53), 5965 (56), May 1904 (FC, UC); on rocks in hot stream, Whakarewarewa, Rotorua, Setchell, 1904 (FC, UC). JAPAN: Y. Tanaka in herb. A. Grunow (W); brook near Rogashima, Miyanoshta, Hakone, H. M. Richards, May 1900 (FH). PALAU ISLANDS: on coralline limestone on the Peleliu airfield, A. C. Mason, 10 Feb. 1949 (FC).

PHILIPPINES: Manila and Rizal province: J. D. Soriano 783, 831, 874, Jan. & Apr. 1951 (FC, PUH); on walls of Malate church, Soriano 57-2, 17 Jun. 1948 (FC, PUH); on decaying organic matter kept moist by rain, third floor of Rizal building, University of the Philippines, Soriano 76, 29 June 1948 (FC, PUH); aquaria, University of the Philippines, Manila, G. T. Velasquez 444, 591, 21 Feb. 1940, 11 Jan. 1941 (FC); on cement walls, botany garden, University of the Philippines, Manila, Velasquez 445, 21 Feb. 1940 (FC); on walls, Reina Regente street, Manila (Binondo), Soriano 309, 17 Jul. 1949 (FC, PUH); on wall, Dapitan and Trabajo streets, Sampaloc, Soriano 405, 9 Oct. 1949 (FC, PUH); on adobe wall, Ermita, Soriano 200-3, 9 Nov. 1948 (FC, PUH); walls of ice plant, Marikina, Soriano 898, 27 Apr. 1952 (FC, PUH); cultivated at Fisheries experiment station, Dagat-Dagatan, Navotas, Velasquez 628, 19 Jan. 1941 (FC). Mindoro: bark of coconut, Tabinay Maliit, Puerto Galera, Velasquez 737, 7 Apr. 1941 (FC); hot spring at Bisayaan, Puerto Galera, Velasquez 1039, 26 Apr. 1941 (FC); Big Balatero, Puerto Galera, Velasquez 9, 15 Apr. 1953 (FC, PUH). Palawan: Araceli, Velasquez 2922, 2932, 15 Jun. 1951 (FC, PUH); Coron, Velasquez 2793, 3 June 1951 (FC, PUH); Cuyo, Velasquez 2801, 10 Jun. 1951 (FC, PUH). Panay island: on walls and fences, Iloilo City, Soriano 1009, 1020, 1056, Jun. Jul. 1952 (FC, PUH); dikes in Griños fishponds, Loganes, Iloilo prov., Soriano 1590, 11 Jan. 1953

(FC, PUH); walls of cemetery, Pototan, Soriano 1836, 23 Feb. 1953 (FC, PUH); on adobe walls, Passi, Iloilo province, Soriano 1066, 1073, 20 Jul. 1952 (FC, PUH); wall along road to the beach, San Jose, Antique province, Soriano 1525, 1 Dec. 1952 (FC, PUH). Sulu archipelago: Busbos, Jolo, Velasquez 3246, 3247, 22 May 1952 (FC, PUH). NEW CALEDONIA: lily pool, Ile Ouin, J. T. Buchholz 1667B, 8-9 Feb. 1948 (FC, UC).

CHINA: Fukien: on the wall of a hot spring, Huangchun, Foochow, H. H. Chung A433, Sept. 1926 (Type of *Gloeocapsa minutula* Gardn., FH; isotype, UC), A436, Sept. 1926 (D, FH); on wet rock, Kushan near Foochow, Chung A436c, Aug. 1926 (Type of *G. multispherica* Gardn., FH; isotype, D [Fig. 21]). Hopeh: on stone by stream, Lying Buddha Temple, Peiping, Y. C. H. Wang 195, 1930—31 (FC, UC); on rock, Jade Spring Hill, Peiping, Wang 287a, 1930—31 (FC, UC). Kiangsu: Suchau, N. G. Gu (NY); on rock at a spring pool, Tshishiasan, C. C. Wang 335, 20 Apr. 1930 (FC, UC); on rocks and walls, Nanking, Y. C. H. Wang 53, 60, 75, 95, 1930 (FC, UC); on rocks and walls, Nanking, C. C. Wang 302, 303, 332, Apr. 1930 (FC, UC); on tree bark, National Central University, Nanking, C. C. Wang 353, 357, 409, Apr. 1930, May 1931 (FC, UC). Szechwan: Chin-Chen-Shan, H. Chu 1343, 7 Aug. 1941 (Types of *G. incrustata* H. Chu, *Entophysis sinensis* H. Chu, and *Anacystis? hyalina* H. Chu, FC); on wet rocks, Omei, Chu 1015, 1353, 1363, 1389, 23—25 Aug. 1942 (FC); wet rock, Ko-Fu-Tung, Mt. King-Fu, Nan-chwan, Chu 849, 15 Apr. 1945 (FC); wet rock, Lung-chi bridge, Nanzechwan, Chu 716, 7 Aug. 1945 (FC). Yunnan: an den Sinterassen der Quelle von Bödö (Peti) se von Dschungdien, H. Handel-Mazzetti 4478, 4 Aug. 1914 (Type of *Gloeotheca siphacea* Skuja, W; isotype, D); an Kalkfelsen bei der heissen Schwefelquelle unter Baoschi bei Dschungdien, Handel-Mazzetti 7729, 17 Aug. 1915 (Type of *Synechococcus ambiguus* Skuja, W [Fig. 67]; isotype, D).

NEW GUINEA: on rocks along a stream, Finschhafen, Papua, L. B. Martin, Jun. 1945 (FC); Cycloopeberge, Lorenz, 11—15 Apr. (L). INDONESIA: grotten rivier bij Pankadjene, A. Weber-van Bosse 938, 939, 1899—1900 (L). Bira: grot, Weber-van Bosse 879, 1899—1900 (FC, L). West Borneo: warme bron bij Moeka-Moeka, Weber-van Bosse 674, 1888 (FC, L). Celebes: grot bij Maros, Weber-van Bosse 789, Sept. 1888 (FC, L). Java: bij Kampong Nglijep, zuidkust, P. Groenbart d, Oct. 1936 (L). Kangean: grot, Weber-van Bosse, 1899—1900 (L). Sumatra: Ngalan bij Pakajombah, Weber-van Bosse 704, 706, 1888 (FC, L); an Steinen, Frauenbadeteich, Kadja, A. Thienemann, 7 Mar. 1929 (Type of *Cbrococcidiopsis thermalis* Geitl., slide no. SKW2cc in collection of L. Geitler). Talaud (Talaue) island: à l'embouchure de la rivière, Liroeng, Salebaboe island, Weber-van Bosse, 1899—1900 (L). AUSTRALIA: Queensland: on tree trunk, Myora, A. B. Cribb G, 26 Feb. 1946 (FC); bottom of Day's lagoon, Moreton island, Cribb 143-1, 26 May 1951 (FC). BURMA: Cantonment Gardens, Rangoon, L. P. Khanna 335, 9 May 1935 (FC); Kyauktan, Rangoon, Khanna 451, 22 Aug. 1935 (Type of *Gloeotheca rhodochlamys* Skuja, FC [Fig. 72]); Maymyo, Northern Shan States, Khanna 639, 12 May 1936 (FC). INDIA: Calcutta, H. B. C. (L); auf Steinen im Victoria-Garden in Bombay, A. Hansgirg, 20 Nov. 1895 (FC, W); Felsen vor Poona, Hansgirg, 20 Oct. 1895 (FC, W). MAURITIUS: sur les arbres, J. McGregor, Apr. 1819 (BM, D).

4b. *ANACYSTIS MONTANA* f. *MINOR* Drouet & Daily, Butler Univ. Bot. Stud. 10: 221. 1952. *Aphanotheca saxicola* β *aquatica* f. *minor* Wille, Öfvers. K. Sv. Vet.-Akad. Förh. 36(5): 22. 1879. *A. saxicola* f. *minor* Wille ex Forti, Syll. Myxophyc., p. 81. 1907. —Type from Matotchkin, Nova Zembla (S).

Microhaloa firma Kützing, Tab. Phyc. 1: 6. 1846. *Palmella firma* Brébisson & Lenormand pro synon. in Kützing, loc. cit. 1846. *Micraloa firma* Kützing ex Trevisan, Sagg. Monogr. Alg. Coccot., p. 38. 1848. *Polycystis firma* Rabenhorst, Fl. Eur. Algar. 2: 53. 1865. *Coccochloris firma* Richter in Hauck & Richter, Phyk. Univ. 13: 649A. 1894. *Microcystis firma* Schmidle, Engler Bot. Jahrb. 23: 57. 1902. *Anacystis firma* Drouet & Daily, Lloydia 11: 77. 1948. —Type from Falaise, France (L). Kützing's notation of the original specimen in Tab. Phyc. 1:6 (1846) as "Heisse Bäder der Euganeen: Lenormand!" is obviously an editorial error. We can surmise that he intended to correct this mistake in Sp. Algar., p. 207 (1849), where he says simply, "Prope Falaise legit amic. Brébisson (Lenormand)".

Palmella hyalina γ *seriata* Kützing, Sp. Algar., p. 215. 1849. —Type from Falaise, France (L). FIG. 95.

Palmella sudetica Rabenhorst, Alg. Sachs. 11 & 12: 105. 1851. —Type from the Riesengebirge, Silesia (L). FIG. 94.

Aphanotheca Trentepohlii Grunow in Rabenhorst, Fl. Eur. Alg. 2: 65. 1865. *Nostoc Trentepohlii* Mohr pro synon. ex Grunow in Rabenhorst, loc. cit. 1865. *Coccochloris Trentepohlii* Richter in Hauck & Richter, Phyk. Univ. 4: 194. 1888. —Type from Kiel, Germany (W).

Anacystis glauca Wolle, Bull. Torr. Bot. Club 6: 182. 1877. *Microcystis glauca* Drouet & Daily, Field Mus. Bot. Ser. 20: 72. 1939. *Polycystis glauca* Drouet & Daily, Field Mus. Bot. Ser. 20: 125. 1942. —Type from Bethlehem, Pennsylvania (FC). FIG. 93.

Nostoc microscopicum var. *linguiforme* Hansgirg, Prodr. Algenfl. Böhmen 2: 65. 1892. —Type from Krummau, Bohemia (W). FIG. 96.

Chroococcus parallelepipedon Schmidle, Engler Bot. Jahrb. 30: 242. 1901. —Type from Lake Nyasa, Tanganyika (ZT). FIG. 91.

Aphanocapsa elachista var. *irregularis* Boye Petersen, Bot. Icel. 2(2, 7): 265. 1923. *Microcystis pulvereae* f. *irregularis* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938. —Type from Grimsa, Iceland (in the collection of J. Boye Petersen). FIG. 97.

Aphanocapsa Farlowiana Drouet & Daily, Field Mus. Bot. Ser. 20: 125. 1942. —Type from Falmouth, Massachusetts (D). FIG. 92.

Radiocystis geminata Skuja, Symbolae Bot. Upsal. 9(3): 43. 1948. —Type from Uppland, Sweden (in the collection of H. Skuja).

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Pleurococcus pulvereus Wood, Smiths. Contrib. Knowl. 241: 79. 1872. *Anacystis pulvereae* Wolle, Fresh-w. Alg. U. S., p. 329. 1887. *Polycystis pulvereae* Wolle ex Hansgirg, Prodr. Algenfl. Böhmen 2: 145. 1892. *Microcystis pulvereae* Forti, Syll. Myxophyc., p. 92. 1907; Migula ex Lemmermann, Krypt. Fl. Mark Brandenb. 2: 77. 1907.

Aphanocapsa Grevillei var. *microgranula* West, Journ. Linn. Soc. Bot. 29: 199. 1892.

Aplococcus natans Roze, Journ. de Bot. 10: 321. 1896.

Polycystis pallida Lemmermann, Bot. Centralbl. 76: 154. 1898. *P. stagnalis* Lemmermann, Ber. Deutsch. Bot. Ges. 18: 24. 1900. *Microcystis stagnalis* Lemmermann, Forschungsber. Biol. Sta. Plön 10: 150. 1903. *M. pulvereae* f. *stagnalis* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938.

Microcystis stagnalis var. *pulchra* Lemmermann, Arch. f. Hydrobiol. & Planktonk. 5: 303. 1910. *M. pulvereae* f. *pulchra* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938.

Microcystis minima Bernard, Protococc. & Desmid. d'Eau Douce, p. 49. 1908.

Chroococcus dispersus var. *minor* G. M. Smith, Bull. Wisconsin Geol. & Nat. Hist. Surv. 57: 28. 1920. *Gloeocapsa minima* f. *Smithii* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 242. 1938.

Aphanocapsa elachista var. *planctonica* G. M. Smith, Bull. Wisconsin Geol. & Nat. Hist. Surv. 57: 42. 1920. *Microcystis pulvereae* f. *planctonica* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 124. 1938.

Aphanocapsa endophytica G. M. Smith, Bull. Wisconsin Geol. & Nat. Hist. Surv. 57: 42. 1920. *Microcystis endophytica* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 139. 1938.

Aphanocapsa siderosphaera Naumann, K. Sv. Vet.-Akad. Handl. 62(4): 18. 1921.

Aphanocapsa sideroderma Naumann, K. Sv. Vet.-Akad. Handl. 62(4): 18. 1921.

Aphanocapsa Koordersii Strøm, Nyt Mag. Naturvid. 61: 128. 1923. *Microcystis Koordersii* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 140. 1938.

Microcystis exigua Zalesky, Rév. Gén. de Bot. 38: 34. 1926.

Microcystis pulvereae var. *racemiformis* Nygaard, K. Danske Vidensk. Selsk. Biol. Skr. 7(1): 183. 1949.

Plantae aeruginaeae, aquaticae, cellulis in divisione binis depresso—sub-sphaericis, aetate provecta globosis diametro 2— 3μ crassis, sine ordine (saepe conferte) per gelatinum vaginale distributis; gelatino vaginale homoganeo, hyalino, firmo vel (saepe omnino) diffuente. FIGS. 91—97.

In shallow water of freshwater ponds, lakes, and streams, often in the plankton, seldom in brackish water.

Specimens examined:

NOVA ZEMBLA: Matotchkin, F. Kjellman 24b, 1875 (Type of *Aphanothece saxicola* β *aquatica* f. *minor* Wille, S). NORWAY: Valders, in rupibus ad Skogstad, N. Wille, 31 Jul. 1879 (D, S); Aas pr. Kristiania, Wille, Aug. 1890 (S). SWEDEN: plankton, Uppland, H. Skuja (Type of *Radiocystis geminata* Skuja in plankton collection of H. Skuja); Grimstorp, Vestergötland, O. Nordstedt, Sept. 1867 (S); Vassitjokko, Torne Lappmark, O. Borge 3, Jul. 1909 (S); Möja, Borge, Jun. 1931 (S); Lassby backar, Uppsala, A. Grevillius, May 1883 (S); in turfosis ad Stromsberg prope Jonköping, Nordstedt, Aug. 1879 (as *Cylindrospermum macrospermum* in Witr. & Nordst., Alg. Exs. no. 396a, FC); Dalsland, Hallan, V. Wittrock, 10 Jun. 1865 (D, S), 12 Jul. 1866 (D, S); as *Aphanocapsa Castagnei* in Witr. & Nordst., Alg. Exs. no. 299, FC, L, NY, S); in stagno ad Kvikjkjokk Lapponiae Lulensis, G. Lagerheim, Jul. 1883 (D, S). DENMARK: Markerup Moor, L. Hansen (MO, NY), W. F. R. Suringar 127, 3 Sept. 1849 (L). POLAND: Silesia: in stagno ad Falkenberg, B. Schröder, Jul. 1893 (D, S), Schmula, July 1893 (S); im Aquarium des pflanzenphysiol.

Institut der Universität, Breslau, *Schröder*, Sept. 1892 (as *Coccochloris firma* in Hauck & Richt., *Phyk. Univ.* no. 649B, L, MIN); in verlassenen Steinbrüchen am Galgenberge bei Strehlen, *Hülse*, Aug. 1860 (as *Palmella botryoides* in Rabenh. Alg. no. 1037, L); Felswände am Zackenfall im Riesengebirge, *Peck* (Type of *Palmella sudetica* Rabenh., in Rabenh. Alg. no. 105, L; isotypes, D, FC [Fig. 94]). GERMANY: Kiliae, *Mohr* (Type of *Aphanothece Trentepohlii* Grun., W; isotypes, BM, L, MO); bei Angeln, Schleswig-Holstein (L); in Torfgruben bei Flensburg, R. *Häcker* (as *Coccochloris stagnina* in Breutel, Alg. Exs. no. 415, L, UC); im Rehwinkel (Brandenburg), *Itzigsohn & Rothe*, Jul. 1852 (as *Microbaloa firma* in Rabenh. Alg. no. 203, FC, L, NY); Gr. Plöner See, W. *Rohde*, 15 Sept. 1950 (FC); im Teiche der Parthenquelle bei Schönbach um Colditz (Sachsen), P. *Richter*, Jul. 1892 (as *Coccochloris firma* in Hauck & Richt., *Phyk. Univ.* no. 649A, L, MIN, NY); Parkteiche in Erdmannsdorf bei Schmiedeberg (Brandenburg), G. *Hieronymus* 710, July 1887 (MICH), Aug. 1887 (as *C. Trentepohlii* in Hauck & Richt., *Phyk. Univ.* no. 194, L); Münster (Westfalen), *Sendiner*, Apr. 1850 (B); schwimmend in Titisee (Baden), A. *Braun* 127, May 1848 (L); im Moor bei Freiburg-im-Baden, *Braun* 128, Aug. 1848 (L).

CZECHOSLOVAKIA: Moravia: rybník, F. *Nováček*, 16 Jul. 1934 (D, FC). Bohemia: Dessendorf, A. *Hansgirk*, Jul. 1885 (FC, W); am Urkalk bei Krummau, *Hansgirk*, Aug. 1884 (Type of *Nostoc microscopium* var. *linguiforme* Hansg., W; isotype, FC [Fig. 96]); Plas prope Pilsen, *Hansgirk*, Aug. 1887 (FC, W); Pocátky, *Hansgirk*, Aug. 1888 (FC, W); Riesengrund—Petzer im Riesengebirge, *Hansgirk*, Jul. 1887 (FC, W). SWITZERLAND: in einem Sumpfe des Torfmoores zwischen Einsiedeln und dem Etzel, Schwyz, C. O. *Harz* (as *Polycystis firma* in Wartm. & Wint., Schweiz. Krypt. no. 845, MIN). SCOTLAND: in a hill loch near Faskally House, Pitlochry, Perthshire, A. J. *Brook*, Autumn 1953 (FC). NETHERLANDS: in vijvers bij Beek, Noord Brabant, A. *Weber-van Bosse* 146, Apr. 1886 (L); plassen van Brenkelveen en Tienhoven, W. *Vervoort*, May 1942 (L); Nieuwkoopse plassen, S. J. *van Oostroom* 7208, May 1937 (L). FRANCE: eaux tranquilles (as *Palmella hyalina* in Desmaz., Pl. Crypt. Fr., ed. 2, no. 215, L). Calvados: Caen, A. de *Brébisson*, ex herb. Lenormand (FC, FH, L); Caen etc., eaux douces (as *P. hyalina* in Chauvin, Alg. de Normandie no. 130, L, UC); marais de Plainville, de *Brébisson* (NY); Vire, herb. Lenormand no. 111 (L), de *Brébisson* 812 (L); Falaise, ex herb. Chauvin no. 74 (UC); Falaise, ex herb. Lenormand (LD, UC); Falaise, de *Brébisson* 182 (L), 439 (Type of *Palmella hyalina* γ *seriata* Kütz., L [Fig. 95]; isotype, UC), 533 (Type of *Microbaloa firma* Kütz., L; isotypes, B, D, FH, S, UC), 963 (FC). Manche: Mortain, de *Brébisson* (S), 782 (L). Seine: Lac du Bourget, *Joly*, 10 Mar. 1951 (FC, PC). Vosges: Bruyères, J. B. *Mougeot* (as *Palmella hyalina* in Roumeguère, Alg. de Fr. no. 111, L). TANGANYIKA: am Seeufer, Langenburg am Nyassasee, W. *Goetze* 866, Apr. 1899 (Type of *Chroococcus parallelepipedon* Schmidle, ZT [Fig. 91]). ICELAND: among Myriophyllum, stagnant water in a branch to Grimsá, Vallanes, J. *Boye Petersen*, 26 Jun. 1914 (Type of *Aphanocapsa elachista* var. *irregularis* Boye Petersen in collection of J. Boye Petersen; isotype, D [Fig. 97]). BERMUDA: pool near Harrington sound, F. S. *Collins* 7118, Apr. 1912 (NY).

MASSACHUSETTS: Bateman's pond, Concord, R. H. *Howe Jr.*, Dec. 1908 (FH); Horn pond, Woburn, F. S. *Collins* 5376, 9 Sept. 1905 (FH; as *Aphanothece saxicola* in Coll., Hold., & Setch., *Phyc. Bor.-Amer.* no. 1301, FC, D, L, TA); Hammond pond, Brookline, B. M. *Davis*, Oct. 1893 (MICH); Hammond pond, Newton, W. G. *Farlow*, Oct. 1890 (FC, TA, UC); in shallow water, Oyster pond, Falmouth, R. N. *Webster & Drouet* 2156, 16 July 1938 (Type of *Aphanocapsa Farlowiana* Dr. & Daily, D [Fig. 92]; isotypes, DA, FH, L, NY, S, UC), J. *Bader* 119, 30 July 1938 (D), V. *Trombetta & Drouet* 2184, 8 Sept. 1937 (D). RHODE ISLAND: Hope reservoir, Providence, *Appleton*, Dec. 1883 (FC, NY). QUEBEC: in a lake, Maniwaki, Hull county, J. *Brunel* 390, 7 Jul. 1933 (FC); Yamaska mountain, on cliffs, *Brunel* 234, 2 Jun. 1931 (FC); près du 17^e portage de la Kogaluk, à environ 74 milles de la baie d'Hudson, boue d'un étang, J. *Rousseau* 517, 24 Jul. 1948 (FC); Lac Brennen, Rawdon, comté de Montcalm, S. M. J. *Eudes* 292-28, 29 Aug. 1941 (FC). NEW YORK: in Pond brook at Buffalo creek, Elma, Erie county, J. *Blum* 324, 23 Jul. 1949 (FC); in (middle) Lehn springs, Williamsville, Erie county, *Blum* 173, 5 Feb. 1949 (FC). PENNSYLVANIA: in fonte rupium calcareorum ad Bethlehem, F. *Wolle*, 1884 (Type of *Anacystis glauca* Wolle in Wittr. & Nordst., Alg. Exs. no. 796, FC; isotypes, FI, L [Fig. 93], NY, UC); lime stone springs, *Wolle* (L). VIRGINIA: culture of plankton from York river at Yorktown, J. C. *Strickland* 1413, 24 Aug. 1942 (FC, ST). NORTH CAROLINA: rocks below Dry falls, Highlands, Macon county, H. C. *Bold* H215, H247, 29 Jun. 1939 (FC); in Lake Anthony, Pineola, Forest county, *Bold* H377, 25 Jul. 1939 (FC); on wet rocks, Cullasaja gorge, Macon county, *Bold* H157, H158, H161b, 17 Jun. 1939 (FC). SOUTH CAROLINA: in Alligator lake near Myrtle Beach, Horry county, P. J. *Philson* SC80, SC82, 21 Sept. 1938 (FC); Easttote river, Pickens county, H. C. *Bold*, Jul. 1939 (FC). FLORIDA: Leesburg, M. A. *Brannon* 333, 31 May 1948 (FC, PC); Gainesville, *Brannon* 70, 268, 326, 1942—46 (FC, PC); sink[hole], Gainesville, R. K. *Straun* 308, 10 May 1948 (FC, PC); Lake Mise, 16 miles northwest of Gainesville, *Brannon* 615, 15 May 1948 (FC, PC). OHIO: wet sandstone, Old Mans Cave state park, Hocking county, W. A. *Daily & F. K. Daily* 519, 536, 554, 27 Jul. 1940 (DA, FC); wet sandstone, Cantwell Cliff state park, Hocking county, *Daily* 713, 1 Sept. 1940 (DA, FC); Biddles pond, Athens county, A. H. *Blickle*, 6 May 1941 (DA, FC).

KENTUCKY: on rock in Mammoth Cave park, B. B. McInteer 1074, 11 Jun. 1940 (DA, FC). TENNESSEE: sluiceway just above last homestead from Elkmont to Blanket mountain, Sevier county, H. Silva 194, 28 Sept. 1941 (FC, TENN); in pond near Mason Hall, Obion county, Silva 1248, 8 Jul. 1949 (FC, TENN). INDIANA: outlet of Lost lake, Lake Maxinkuckee, Marshall county, H. W. Clark & B. W. Evermann 265, 27 Jul. 1906 (FC, US). WISCONSIN: Clear lake, Bradley, Lincoln county, F. C. Seymour, 17 Sept. 1951 (FC); Bolton lake, Vilas county, G. W. Prescott 2W243, 8 Jul. 1937 (FC). ILLINOIS: north shore of Lake Glendale, Robbinsville recreational area in Shawnee national forest, Pope county, H. K. Phinney 1067, 1 Sept. 1944 (FC, PHI). MINNESOTA: in and near Itasca state park, K. C. Fan 10267, F. Drouet 12199, Jun., Jul. 1954 (D, MIN). ARKANSAS: from a large spring-slough, Imboden, Lawrence county, B. C. Marshall P, May 1931 (NY). NEBRASKA: culture from a roadside ditch 4 miles east of Maxwell, Lincoln county, W. Kiener 16463c, 1 Oct. 1944 (FC, KI). MONTANA: in Bitterroot slough below country club, Missoula, F. H. Rose 4117, 3 May 1941 (FC). COLORADO: pool, Peaceful valley slope, Boulder county, Kiener 1268, 5 Aug. 1934 (FC, KI). UTAH: Columbine falls, Mt. Timpanogos, Utah county, A. O. Garrett 32, 3 Aug. 1925 (FC, UC). ALASKA: Point Barrow, 1883 (FH); 124 and 229 miles south of Fairbanks on Richardson highway, D. Hilliard 3, 8, Sept. 1953 (FC). CALIFORNIA: in ditch by railroad, Emery, Alameda county, N. L. Gardner 1100, 20 Jun. 1903 (FC, UC); laboratory cultures, Berkeley, Gardner 6973, 7147 (FC, UC); plankton of Lily lake near Fallen Leaf lake, Eldorado county, W. A. Seitchell 13, 12 Aug. 1908 (FC, UC); Benton hot springs, Mono county, V. Duran 7797, 13 Apr. 1935 (FC, UC); culture from an irrigation ditch southwest of Folsom, Sacramento county, Gardner 7394, 30 June 1933 (FC, UC).

ECUADOR: in rupibus humidis, Baños, G. Lagerheim, Dec. 1891 (S). PERU: Lago de Pachacamac, A. Maldonado 73a, Jan. 1942 (FC). PHILIPPINES: aquarium, San Augustin College, Iloilo City, J. D. Soriano 1006, 20 Jun. 1952 (FC, PUH). CHINA: on a rope in a stream, Wuhsien (Soochow), Kiangsu, C. C. Wang 367, Apr. 1926 (FC, UC).

4c. *ANACYSTIS MONTANA* f. *GELATINOSA* Drouet & Daily, Butler Univ. Bot. Stud. 10: 221. 1952. *Coccochloris stagnina* f. *gelatinosa* Hennings, Phyk. March. 1: 43. 1893. *Aphanothece gelatinosa* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 69. 1907. *A. stagnina* f. *gelatinosa* Hennings ex Forti, Syll. Myxophyc., p. 77. 1907. —Type from Berlin, Germany (S). FIG. 98.

Aphanocapsa Roeseana de Bary in Rabenhorst, Alg. Eur. 215—217: 2156. 1870; Hedwigia 1870: 74. 1870. *Microcystis Roeseana* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 129. 1938. *Anacystis Roeseana* Drouet & Daily, Lloydia 11: 77. 1948. —Type from Reinhardtsbrunn, Thuringia, Germany (L).

Synechocystis Willei Gardner, Mem. New York Bot. Gard. 7: 2. 1927. —Type from Mayaguez, Puerto Rico (NY). FIG. 99.

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Aphanocapsa arctica Whelden in Polunin, Bot. Canadian Eastern Arctic 2: 21. 1947.

Synechocystis planctonica Proshkina-Lavrenko, Akad. Nauk S. S. R. Bot. Inst. Ord. Sporovykh. Rost. Bot. Mater. 6: 69. 1950.

Plantae aerugineae, aquaticae, cellulis in divisione binis depresso—sub-sphaericis, aetate provecta globosis diametro 5—6 μ crassis, sine ordine per gelatinum vaginale distributis; gelatino vaginale homoganeo, hyalino, saepe omnino diffuente. FIGS. 98, 99.

In shallow water of permanent freshwater ponds, lakes, etc., seldom appearing in brackish water. That the type specimens concerned here are large forms of *Anacystis montana* is unquestionable. Some other specimens cited (Humm & Nielsen 1790, 1791, 1794, for example) may in the future prove to be actively dividing growth-forms of *Coccochloris stagnina*, in which the cells do not become elongate before division begins again.

Specimens examined:

SWEDEN: Stockholm, Danviks krok, G. Lagerheim, Jun. 1881 (D, S). GERMANY: in den Teichen bei Reinhardtsbrunn, Thüringen, A. de Bary (Type of *Aphanocapsa Roeseana* de Bary in Rabenh. Alg. no. 2156, L; isotypes, D, FC, UC); Teich in Berliner botanischen Garten, P. Hennings,

Jul. 1891, Apr. 1892 (Type of *Coccochloris stagnina* f. *gelatinosa* Henn. in Henn., Phyk. March. no. 43, S; isotypes, FH, L, NY [Fig. 98]); Berlin, Hennings, Jan. 1892 (as *C. stagnina* f. *gelatinosa* in Hauck & Richt., Phyk. Univ. no. 747, L, MIN, NY, S); an einem Wassertroge in Königstein (Sachsen), W. Krieger, Sept. 1884 (TA). NORTH CAROLINA: Mullet pond, Shackleford Banks near Beaufort, H. J. Humm & C. S. Nielsen 1790, 1791, 1794, 23 Aug. 1949 (FC, T). TENNESSEE: seepage, Scottish Pike at L. & N. railroad overpass, Knoxville, H. Silva 477, 17 Jan. 1947 (FC, TENN). COLORADO: Howard lake, Boulder county, R. W. Pennak, 13 Jun. 1948 (FC). PUERTO RICO: Mayaguez, N. Wille 1318, Feb. 1915 (NY); 4 km. north of Mayaguez, Wille 1329 (NY), 1329b (Type of *Synechocystis Willei* Gardn., NY [Fig. 99]), Feb. 1915. TRINIDAD: Pitch lake, La Brea, H. Field, 25 Mar. 1942 (FC). MEXICO: plankton, Lago Patzcuaro, Michoacan, B. F. Osorio Tafall, 1941 (FC), E. S. Deevey, 10 Jul. 1941 (FC). GUATEMALA: in hot pool and in edge of lake, Lago Amatitlán, P. C. Standley 89443, 89472, 15 Mar. 1941 (FC). PHILIPPINES: submerged on quiet sides of Okoy river, Palinpinon, Oriental Negros, J. D. Soriano 1897, 6 Apr. 1953 (FC, PUH).

5. ANACYSTIS DIMIDIATA Drouet & Daily, Butler Univ. Bot. Stud. 10: 221. 1952.

Trochiscia dimidiata Kützing, Linnaea 8: 593. 1833. *Protococcus dimidiatus* Kützing, Phyc. Gener., p. 168. 1843. *Pleurococcus dimidiatus* Trevisan, Sagg. Monogr. Alg. Coccot., p. 33. 1848. *Chroococcus dimidiatus* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. *C. turgidus* var. *dimidiatus* Brébisson in Rabenhorst, Alg. Eur. 201—204: 2033. 1867. *Gloeocapsa dimidiata* Drouet & Daily, Lloydia 11: 78. 1948. —Type from Nordhausen, Germany (L). FIG. 105.

Pleurococcus thermalis Meneghini, Consp. Algol. Eug., p. 337. 1837. *Protococcus thermalis* Kützing, Tab. Phyc. 1: 5. 1846. *Chroococcus thermalis* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. *C. turgidus* f. *thermalis* Rabenhorst, Fl. Eur. Algar. 2: 33. 1865. *Pleurococcus vulgaris* f. *thermalis* Brébisson in Mougeot & Roumeguère in Louis, La Département des Vosges, 1887: Algues, p. 18 of reprint. 1887. *Chroococcus turgidus* var. *thermalis* Rabenhorst ex Hansgirg, Prodr. Algenfl. Böhmen 2: 161. 1892. *C. turgidus* γ *thermalis* Rabenhorst ex Wille, Nyt Mag. Naturvid. 62: 180. 1925. —Type from Abano, Italy (FI).

Protococcus turgidus Kützing, Tab. Phyc. 1: 5. 1846. *P. turgidus* α *chalybeus* Kützing, loc. cit. 1846. *Pleurococcus turgidus* Trevisan, Sagg. Monogr. Alg. Coccot., p. 34. 1848. *Chroococcus turgidus* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. *C. chalybeus* Rabenhorst, Alg. Eur. 115—116: 1144. 1861. *C. aeruginosus* Rabenhorst pro synon., loc. cit. 1861. *Protococcus chalybeus* Kützing pro synon. ex Rabenhorst, Krypt.-Fl. Sachs. 1: 69. 1863. *Chroococcus turgidus* a. *chalybeus* Rabenh. ex Kirchner, Krypt.-Fl. Schlesien 2(1): 262. 1878. *Gloeocapsa turgida* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 211. 1938. —Type from Freiburg im Breisgau, Germany (L). FIG. 100.

Protococcus turgidus β *fuscescens* Kützing, Tab. Phyc. 1: 5. 1846. *Chroococcus fuscescens* Richter in Bot. Ergebn. Drygalski's Grönlandexped., A. Kryptog. 1: 3. 1897. *C. turgidus* var. *fuscescens* Forti, Syll. Myxophyc., p. 13. 1907. —Type from Freiburg im Breisgau, Germany (L). FIG. 100.

Chroococcus thermophilus Wood, Amer. Journ. Sci. & Arts, ser. 2, 46: 34. 1868. —Type from Benton hot springs, Mono county, California (PH).

Chroococcus turgidus var. *Hookeri* Lagerheim, Ofvers. K. Sv. Vet.-Akad. Förh. 40(2): 38. 1883. —Type from Kristineberg, Sweden (S). FIG. 102.

Chroococcus turgidus var. *tenax* Kirchner, Krypt.-Fl. Schlesien 2(1): 262. 1878. *C. tenax* Hieronymus, Beitr. Biol. Pfl. 5: 483. 1892. *C. turgidus* β *tenax* Kirchner ex Wille, Nyt Mag. Naturvid. 62: 180. 1925. *Gloeocapsa tenax* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 210. 1938. —Material presumably seen by the author, designated as the Type (W).

Chroococcus turgidus var. *subnudus* Hansgirg, Prodr. Algenfl. Böhmen 2: 161. 1892. *C. turgidus* f. *subnudus* Hansgirg in Kirchner, Fl. Exs. Austro-Hung. 2398. *C. turgidus* δ *subnudus* Hansgirg ex Wille, Nyt Mag. Naturvid. 62: 181. 1925. *Gloeocapsa turgida* f. *subnuda* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 212. 1938. —Type from Stechovic, Bohemia (W).

Chroococcus turgidus var. *submarinus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 230. 1892. —Type from Zaule, Trieste (W). FIG. 104.

Chroococcus giganteus West, Trans. Roy. Microsc. Soc. 1892: 741. 1892. *C. turgidus* var. *giganteus* Cedergrén, Bot. Not. 1926: 299. 1926. *Gloeocapsa gigantea* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 220. 1938. —Type from Westmorland, England (BIRM).

Chroococcus schizodermaticus var. *badio-purpureus* W. & G. S. West, Journ. of Bot. 35: 302. 1897. —Type from Golungo Alto, Angola (BM). FIG. 103.

Chroococcus (Rhodococcus) insignis Schmidle, Allgem. Bot. Zeitschr. 1897: 108. 1897. —Type from Freiburg im Breisgau, Germany (ZT), FIG. 101.

Chroococcus Westii Boye Petersen, Bot. Icel. 2(2): 263. 1923. —Cotype from Bielatal in Bohemia (FC, L, UC).

Gloeocapsa palustris Nägeli ex Wille, Nyt Mag. Naturvid. 62: 195. 1925. —Type from Naumattweier, Switzerland (O).

Chroococcus turgidus var. *maximus* Nygaard, Vidensk. Medd. Dansk Naturh. Foren. Kjøbenhavn. 82: 201. 1926. —Type from the Kai islands, Indonesia (in the private collection of G. Nygaard).

Chroococcus giganteus var. *occidentalis* Gardner, Mem. New York Bot. Gard. 7: 8. 1927. *C. giganteus occidentalis* Gardner, New York Acad. Sci., Sci. Surv. Porto Rico 8: 255. 1932. —Type from Laguna Tortuguero, Puerto Rico (NY). FIG. 106.

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Chroococcus multicoloratus Wood, Proc. Amer. Philos. Soc. 11: 122. 1869.

Chroococcus turgidus var. *violaceus* West, Trans. Roy. Microsc. Soc. 1892: 741. 1892. *C. turgidus violaceus* West ex Gardner, New York Acad. Sci., Sci. Surv. Porto Rico 8: 256. 1932. *Gloeocapsa turgida* f. *violacea* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 212. 1938. —G. S. West's sketch and notes in the British Museum (Natural History) are reproduced here: FIG. 107.

Chroococcus solitarius Eichler, Pamietn. Fizyograf. 14(3): 134. 1896.

Chroococcus indicus Bernard, Protococc. & Desmid. d'Eau Douce, p. 47. 1908. *C. Bernardii* van Oye, Hedwigia 63: 177. 1921.

Chroococcus turgidus var. *japonicus* Bernard, Alg. Unicell. Récolt. dans Dom. Malais, p. 16. 1909.

Chroococcus turgidus var. *Pullei* Bernard, Nova Guinea. Résult. de l'Exped. Sci. Néerl. Nouv.-Guinée en 1907 & 1909, 8(Bot. 2): 259. 1910.

Chroococcus turgidus var. *mipitanensis* Woloszynskia, Bull. Int. Acad. Sci. Cracovie, Cl. Sci. Math. & Nat., ser. B, 1912: 692. 1913. *C. mipitanensis* Geitler in Pascher, Süßwasserfl. 12: 79. 1925. *Gloeocapsa turgida* f. *mipitanensis* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 212. 1938.

Chroococcus turgidus var. *violaceus* f. *minor* Wille, Nyt Mag. Naturvid. 61: 76. 1924.

Chroococcus spelaeus Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 76. 1925.

Chroococcus spelaeus var. *aerugineus* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 77. 1925.

Chroococcus spelaus var. *violascens* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 77. 1925.

Chroococcus indicus var. *epiphyticus* Ghose, Journ. Burma Res. Soc. 16: 220. 1926.

Chroococcus quaternarius Zalesky, Rév. Gén. de Bot. 38: 33. 1926. *Gloeocapsa turgida* f. *quaternaria* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 212. 1938.

Chroococcus turgidus var. *solitarius* Ghose, Journ. Burma Res. Soc. 17(3): 245. 1927.

Synechococcus euryphyes Beck-Mannagetta, Vestn. Král. Ces. Spolec. Nauk 1926: 17. 1927.

Chroococcus turgidus f. *minor* Wille, Deutsche Südpolar-Exped. 1901—03, 8: 415. 1928.

Chroococcus turgidus f. *lamellosus* Beck-Mannagetta, Lotos 77: 99. 1929.

Chroococcus turgidus f. *pallidus* Beck-Mannagetta, Lotos 77: 99. 1929.

Synechocystis sallensis Skuja, Acta Horti Bot. Univ. Latv. 4: 12. 1929.

Chroococcus luteolus Woronichin, Trav. Mus. Bot. Acad. Sci. U. R. S. S. 25: 443. 1932.

Chroococcus tenax var. *boeticus* Gonzalez Guerrero, Anal. Jard. Bot. Madrid 6: 242. 1946.

Chroococcus Mutisii Gonzalez Guerrero, Anal. Jard. Bot. Madrid 7: 436. 1947.

Plantae aeruginaeae, violaceae, roseae, vel olivaceae, praecipuius microscopicae 2—16-cellulares, cellulis in divisione binis truncato-hemisphaericis, aetate provecta truncato-globosis vel raro exacte sphaericis, diametro (8—)12—50 μ crassis, sine ordine (aut in seriebus eucapsoideis) per gelatinum vaginale distributis; gelatino vaginale hyalino (rarissime pallidi-luteo), tenue, homoganeo vel plus minusve lamelloso; protoplasmate aerugineo, violaceo, roseo, vel olivaceo, tenui- vel sparse grossi-granuloso. FIGS. 100—107.

In shallow fresh, brackish, and marine waters and in seepage, usually mixed with other algae; often encountered in the plankton. Macroscopic growth-forms of *Anacystis dimidiata* are rarely found; as a rule, a plant breaks in two before it reaches the 8-celled stage. Certain subaerial growths are reminiscent of and may be confused with enlarged cells of *Palmogloea protuberans* (Sm. & Sow.) Kütz. In marine collections, some cells may be suspected of originating from the super-

ficial layers of *Entophrysis deusta*. Where the gelatinous matrix hydrolyzes completely, the cells may resemble somewhat certain short growth-forms of *Coccolithus aeruginosa*. The plants may become parasitized by chytridiaceous fungi.

Specimens examined:

NORWAY: ad Reiersdal in convalle Sætersdalen, O. Nordstedt, Jul. 1872 (as *Chroococcus turgidus* in Wittr. & Nordst., Alg. Exs. no. 100, FC, L). SWEDEN: in Lapponia Lulensi in alpe Njammats prope Kvikkjokk, G. Lagerheim, 5 Aug. 1883 (as *C. turgidus* in Wittr. & Nordst., Alg. Exs. no. 699, FC, L, S); Djurö, Uplandia, O. Borge, Jun. 1909 (S, TA); Möja, Uplandia, Borge, Aug. 1934 (S); Tjörnays, Scania, Borge, May 1893 (S); Naturvetenskap. Station, Torne Lappmark, Borge, Jul. 1909 (S); Vaddö, O. F. Anderson, Jul. 1889 (S); in arena regionis littoralis ad Kristineberg Bahusiae, Lagerheim, Aug. 1882 (Type of *C. turgidus* var. *Hookeri* Lagerh., with *Holopedium sabulicola* in Wittr., Nordst., & Lagerh., Alg. Exs. no. 1549, S; isotype, L [Fig. 102])). POLAND: Silesia: zwischen Sphagnum im "Moosebruch" bei Reihwiesen, J. Nave, Jul. 1861 (as *Chroococcus chalybeus* in Rabenh. Alg. no. 1144b, FC, FH, L, S); Ost-Schlesien, Nave (NY); Kochschlucht unterhalb des Kochelfalles im Riesengebirge, G. Hieronymus, Aug. 1889 (designated as Type of *C. turgidus* var. *tenax* Kirchn., as *C. tenax* in Hauck & Richt., Phyk. Univ. no. 549, W; isotypes, FH, L, NY, UC); Wasserlöchen auf der weissen Wiese bei der Wiesenbaude im Riesengebirge, Hieronymus, Aug. 1887 (as *C. turgidus* var. *chalybeus* in Hauck & Richt., Phyk. Univ. no. 145, L), Hieronymus 751, Sept. 1887 (MICH); Wittgenauer Berge bei Grünberg, Grätzbergwiese auf Ochelhermsdorf zu, B. Schröder, Aug. 1890 (as *C. turgidus* var. *dimidiatus* in Hauck & Richt., Phyk. Univ. no. 482, L, UC). GERMANY: Baden: im Höllenthal bei Freiburg im Breisgau, A. Braun, Sept. 1847 (Type of *Protococcus turgidus* Kütz. and *β fuscescens* Kütz., L [Fig. 100]); an feuchten, schattigen Felsen des Hirschsprunges im Höllenthal bei Freiburg im Breisgau, G. Schmidle, Aug. 1896 (Type of *Chroococcus insignis* Schmidle, ZT [Fig. 101]). Bavaria: prope Nürnberg, J. Kaulfuss, Jun. 1902 (S). Brandenburg: Torfsümpfe des Grunewaldes, P. Hennings, Jul. 1892 (as *C. turgidus* in Henn., Phyk. March. no. 49, FH, L), Jun. 1899 (S). Hesse-Nassau: unter Cladophora, Frankfurt am Main, G. Fresenius (as *C. turgidus* in Rabenh. Alg. Suppl. no. 104, FC, FH, L, UC). Saxony: am Schöneck, P. Richter (UC); in einem Sumpfe zwischen den Rauensteinen, Gerstenberger, Oct. 1860 (as *C. thermalis* in Rabenh. Alg. no. 1413, FC, L, NY); bei Wurzen, 1858, in herb. O. Kuntze (NY); Schönfeld bei Leipzig, Auerswald (FH); bei Dresden, Biene, Apr. 1862 (as *C. turgidus* in Rabenh. Alg. no. 1333, L, NY, UC); Eschdorf, Dresden, Richter, Aug. 1879 (S), Jul. 1880 (as *C. turgidus* in Wittr. & Nordst., Alg. Exs. no. 472, S); in einem Sumpf bei Leipzig, L. Rabenhorst (as *C. turgidus* var. *chalybeus* in Rabenh. Alg. no. 65, L, UC); Leipzig, O. Bulnheim, Dec. 1860 (as *Protococcus chalybeus* in Roumeguère, Alg. de Fr. no. 335, L). Thuringia: an feuchten Felsen der Ludwigsklamm, Eisenach, W. Migula, 23 Jul. 1931 (S); as *Chroococcus turgidus* in Mig., Krypt. Germ., Austr., & Helv. Exs., Alg. no. 254, FC, TA); in dem Moor der Teufelskreise am Schneekopf, A. Röse (as *Pleurococcus angulosus* in Rabenh. Alg. no. 327, FC); Bruchberg, Römer (NY); Nordhausen, in einer Wasserflasche, F. T. Kützling (Type of *Trochiscia dimidiata* Kütz., L [Fig. 105])).

CZECHOSLOVAKIA: Moravia: in stagnierenden Buchten der Tess bei Winkelsdorf, Kolenati, Sept. 1861 (as *Chroococcus chalybeus* in Rabenh. Alg. no. 1144, FC, L, UC). Slovakia: in fossa rufosa ad lacum Csorber-See in Tatras alta, V. Witrock, 25 Jul. 1885 (as *C. turgidus* in Wittr. & Nordst., Alg. Exs. no. 799, FC, D, L, S). Bohemia: im Bielathale an nassen Felswänden, L. Rabenhorst (cotype of *C. Westii* Boye Petersen, as *Pleurococcus turgidus* in Rabenh. Alg. no. 104, FC, L, UC); Davle a údol. Libric, A. Hansgirk, Jul. 1887 (FC, W); Ouzice, Hansgirk, Oct. 1883 (FC, W); in rupibus madidis prope Stechovic, Hansgirk (Type of *Chroococcus turgidus* var. *subnudus* Hansg. in Fl. Exs. Austro-Hung. no. 2398L, W; isotypes, FC, FH, MIN, MO, S), Apr. 1887 (FC, W). AUSTRIA: Ötcher, Lower Austria, G. de Beck (FC, W); lacus prope Ossiach et St. Leonhard ad Villach, A. Hansgirk, Sept. 1889 (FC, UC); an der Oberfläche eines Moores des Leiterberges (Tyrol) im hohen Gesenke, Kolenati, Sept. 1861 (as *C. chalybeus* in Rabenh. Alg. no. 1144, FC, L, UC); Matrei, Hansgirk, 1891 (FC, W). JUGOSLAVIA: ex caverna (Jelenska Jarna), Franzdorf (Slovenia), Hansgirk, Aug. 1889 (FC, W); Laak prope Steinbrück, Slovenia, Hansgirk, Aug. 1890 (FC, W); Fasano prope Pisino, Istria, Hansgirk, Jul. 1889 (FC, W); lacus ad Boca Niazzo prope Zaram, Hansgirk, Aug. 1888 (FC, W). TRIESTE: in Salinen zwischen Capodistria und Zaule, Hansgirk, Aug. 1889 (Type of *C. turgidus* var. *submarinus* Hansg., W; isotype, FC [Fig. 104]). SWITZERLAND: [Naumattweier, K. von Nägeli, Aug. 1948] (Type of *Gloeocapsa palustris* Näg. in the slide collection of N. Wille, O); am nördlichen Ufer des Katzenssees, Zürich, C. Cramer & C. von Brügger, Jun. 1862 (as *Chroococcus turgidus* in Rabenh. Alg. no. 1444, UC). ITALY: Monfalcone, in aqua subsalsa, Hansgirk, Aug. 1889 (FC, W); S. Margarita prope Ala, Hansgirk, 1891 (FC, W); Abano, herb. Meneghini (Type of *Pleurococcus thermalis* Menegh., FI); therm. Egan., Meneghini (L, S, UC, W); S. Pietro, herb. Meneghini (FI); dans les grottes de St. Avendrace, Cagliari, Sardinia, Marcucci, 1866 (as *Gloeocapsa polydermatica* in Marcucci, Un. Itin. Crypt. no. XXVIII, FC).

BRITISH ISLES: on mosses, Scotland, herb. W. Joshua (FC); Bowness, Westmorland, W. West, Sept. 14 (Type of *Cbroococcus giganteus* West, BIRM); Penzance, Cornwall, T. E. Hazen 3, 1 Aug. 1926 (FC, DA). NETHERLANDS: Friesland, W. F. R. Suringar 55, Jul. 1854 (L). FRANCE: flaques de marais tourbeux des environs de Falaise, Calvados, A. de Brébisson (as *C. turgidus* var. *dimidiatus* in Rabenh. Alg. no. 2033, FC); Falaise, de Brébisson (L, UC); dans les flaques des rochers élevés remplies d'eau salée, Le Croisic, G. Thuret, Aug. 1873 (FC, FH, NY); flaques d'eau pluviale à Bercugnas (Pyénées Centrales), C. Fourcade (as *C. turgidus* in Roumeguère, Alg. de Fr. no. 724, L). BRITISH TOGOLAND: Keta, G. W. Lawson A516, 30 Dec. 1952 (D). ANGOLA: ad rupes juxta rivum Coango, Golungo Alto, F. Welwitsch 5 (FC, UC), 139 (Type of *C. schizodermaticus* var. *badio-purpureus* W. & G. S. West, BM; isotype, BIRM), 140 (FC [Fig. 103], UC), May-Jun. 1856. BERMUDA: W. G. Farlow, Jan. 1900 (FH); Lovers lake, western St. Georges island, A. J. Bernatowicz 49-111, 1 Mar. 1949 (FC). LABRADOR: flaque d'eau sur un rocher de la toundra, Monts Torngat, col de Saglék, J. Rousseau 1097, Aug. 1951 (FC). NEW BRUNSWICK: brooklet, lower basin at falls, Grand Falls, H. Habeeb 12028, 10852, 2 Aug. 1947, 30 Sept. 1948 (FC, HA); pond, St. Anne, Madawaska county, Habeeb 11620, 22 Aug. 1950 (FC, HA); Island lake, 40—50 miles due south of Dalhousie, M. Le Mesurier 2, Aug. 1953 (FC). MAINE: Ragged island, F. S. Collins 4858, Jul. 1903 (FH, NY). NEW HAMPSHIRE: on Sphagnum, bog pond, Lakewood, W. G. Farlow, Aug. 1917 (FH). MASSACHUSETTS: Salisbury Beach, Collins 1700, 1702, May 1890 (NY); rocks, Essex street, Saugus, Collins 1696, Jun. 1890 (NY); high ledge, Saugus, Collins 1560, Apr. 1890 (NY); Medford, Collins, May 1887 (NY); Cedar Swamp, Woods Hole, F. Drouet 1941, 13 Sept. 1936 (D); in tide pools near town landing, Cuttyhunk island, Gosnold, Drouet 2122, 3 Aug. 1937 (D, DT, FH, NY, S); in Sheep pond, Nantucket island, B. F. D. Runk, R. N. Webster, & F. Drouet 2236, 24 Jul. 1938 (D, FH, NY); in a brackish swamp (Chara pond) near Oyster pond, Falmouth, Drouet, R. Patrick, & C. Hodge 3564, 16 Jul. 1940 (FC); in Sphagnum, Lost pond, Brookline, C. Bullard, 14 Jul. 1910 (as *C. turgidus* var. *chalybeus* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1701, FC, L, TA, UC). RHODE ISLAND: tide-pool near Eastons point, Newport, Collins, Apr. 1898 (NY). CONNECTICUT: brackish ditches, Eastern point, Groton, W. A. Setchell, Jul. 1888 (UC).

QUEBEC: mousses d'un étang, embouchure de la Kogaluk, baie d'Hudson, J. Rousseau 208, 16 Jul. 1948 (FC); ruisseau de la toundra et fond humide d'une vallée suspendue, pic Rousseau dans les monts Otish, Rousseau 223, 398, Aug. 1949 (FC); Lac Tashwak, à la source de la rivière Kogaluk, 95 milles de la baie d'Hudson, Rousseau 591, 27 Jul. 1948 (FC); petit source tourbeuse au voisinage du Mt. Pyramid, Rousseau 823, 5 Aug. 1947 (FC); Lac Brennen, Rawdon, Montcalm county, S. M. J. Eudes 291, 29 Aug. 1941 (FC). NEW YORK: Bergen swamp, Genesee county, A. T. Hotchkiss 222, 1949 (D); gorge below falls, Rensselaerville, M. S. Markle 1, 1 Jul. 1946 (FC). MARYLAND: Somerset county: marsh pool at Chance, P. W. Wolle & Drouet 2268, 22 Aug. 1938 (D, UC); marsh pool west of Ewell, Smiths island, Wolle & Drouet 2306, 26 Aug. 1938 (FC, D, FH); Tylerton, Smiths island, P. W. Wolle, 12 Aug. 1938 (FC); pools in the salt marsh south of Jenkins creek, Crisfield, Drouet & Wolle 3633, 3639, 3640, 23 Jul. 1940 (FC). VIRGINIA: wet rocks beside Cascades, Giles county, H. Silva 2787, 12 Jul. 1953 (FC, TENN); wet cliff by Mootmans river in "Sugar Hollow", Albemarle county, J. C. Strickland 662, 6 Oct. 1940 (FC, ST); in ditch, Chincoteague island, Accomac county, L. C. Goldstein, E. S. Luttrell, & Strickland 1178, 7 Jun. 1942 (FC, ST). NORTH CAROLINA: Ocracoke, W. D. Hoyt, Aug. 1906 (NY); on rocks below Dry Falls, Highlands, Macon county, H. C. Bold H235, 29 Jun. 1939 (FC); outlet draining a salt marsh, Hatteras, Dare county, L. G. Williams 2a, 12 Jul. 1949 (FC); tidal flats, Cape Lookout near Beaufort, H. J. Humm & C. S. Neilsen 1797, 26 Aug. 1949 (FC, T). SOUTH CAROLINA: Walhalla tunnel, Walhalla, Oconee county, Bold H126a, H128, 12 June 1939 (FC). FLORIDA: Bivins Arm, Gainesville, M. A. Brannon 126, 7 Nov. 1942 (FC, PC); Marco island, Collier county, P. C. Standley 92809, 14 Mar. 1946 (FC); Station 5 along Flamingo road, Everglades national park, Dade county, D. Blake & R. Hauke, 3 Feb. 1953 (FC, T); in a depression in sand dunes, shore of Apalachicola bay at the east end of John Gorrie causeway, west of Eastpoint, Franklin county, Drouet & C. S. Nielsen 10960, 16 Jan. 1949 (FC, T); on Ruppia, Hernando county, Brannon 559, 23 Oct. 1948 (FC, PC); region of Hendry Creek, about 10 miles south of Fort Myers, Lee county, Standley 73254, Mar. 1940 (FC); laboratory culture, Florida State University, Tallahassee, Nielsen 59, May 1948 (FC, T); with *Anacystis thermalis* in a brackish pond, Key West, M. A. Howe 1736, Nov. 1902 (FH, NY, UC); pools, Long key, Dry Tortugas, W. R. Taylor 21, 77, Jun. 1924 (TA); saline flats and drying pools, Big Pine key, Monroe county, E. P. Killip 41806, 43205, 22 Jan. 1952, 5 Apr. 1953 (FC, US).

OHIO: on moss and rock, Adams county, W. A. Daily 298, 300, 25 May 1940 (FC, DA); quarry pools, Kellys island, Erie county, C. E. Taft, 6 July 1938 (FC, DA); Eden park, Cincinnati, Daily 407, 3 July 1940 (FC, DA), F. K. Daily, 24 Aug. 1940 (FC, DA); "Seven Caves", Paint, Highland county, W. A. & F. K. Daily 322, 332, 334, 336, 16 June 1940 (FC, DA); sandstone, Old Mans Cave state park, Hocking county, W. A. & F. K. Daily 511, 527, 534, 535, 544, 548, 553, 27 July 1940 (DA, FC); Cantwell Cliff state park, Hocking county, W. A. Daily 688, 693, 727, 731, Aug.-Sept. 1940 (DA, FC); in quarry, Junction City, Perry county, J. H. Hoskins & A. H. Bickley, 14 Oct. 1939 (DA, FC). KENTUCKY: sandstone, Natural Bridge state park, Powell county, W. A.

& F. K. *Daily* 372, 30 Jun. 1940 (DA, FC); sandstone, "Tight Holler" near Pine Ridge, Wolfe county, W. A. *Daily*, A. T. *Cross*, & J. *Tucker* 785, 6 Sept. 1940 (DA, FC); sandstone, Torrent, Wolfe county, W. A. & F. K. *Daily* & R. *Kosanke* 468, 470, 471, 475, 482, 484, 486, 493, 494, 14 Jul. 1940 (DA, FC). TENNESSEE: in lake, Hidden Lake, Davidson county, H. C. *Bold* 138b, 1 Oct. 1938 (FC); lily pool, Vanderbilt University, Nashville, *Bold* 10, 1937 (FC); wet limestone at entrance of Bellamy cave, Montgomery county, H. *Silva* 1405, 15 Jul. 1949 (FC, TENN); wet rocks etc., Ramsey Cascades, Sevier county, *Silva* 136, 2350b, Sept. 1941, 1950 (FC, TENN), *Bold* H352a, H353, 18 Jul. 1939 (FC). MICHIGAN: Livingston's Bog, Cheboygan county, A. H. *Gustafson*, 1937 (FC), H. K. *Phinney* 2M40/2, 25 Jun. 1940 (FC, PHI); Mud lake, Douglas Lake region, *Phinney* 515, 8 Aug. 1943 (FC, PHI); pool, North Fishtail bay, Douglas Lake, *Phinney* 151, 31 Jul. 1942 (FC, PHI); stream near Twin Lakes on highway M28, Luce county, *Phinney* 20M40/51, 27 Jul. 1940 (FC, PHI); Echo lake, Bois Blanc island, Mackinac county, *Phinney* 35, 8 Jul. 1942 (FC, PHI). INDIANA: limestone, Clifty Falls state park, Madison, Jefferson county, W. A. & F. K. *Daily* 675, 676, 4 Aug. 1940 (DA, FC); Daniels lake 5 miles southeast of North Webster, Kosciusko county, F. K. & W. A. *Daily* 2265, 26 Jul. 1950 (DA, FC); Hawk's marsh, Lake Maxinkuckee, Marshall county, H. W. *Clark* & B. W. *Evermann* 14, 41, 13 Aug. 1906 (FC, US); sandstone, Shades state park, Waveland, Montgomery county, F. K. & W. A. *Daily* 969, 6 Jun. 1942 (DA, FC); Gentian lake 6 miles north of Angola, Steuben county, F. K. & W. A. *Daily* 2672, 24 Aug. 1953 (DA, FC); pond, Glenn Home, Vigo county, B. H. *Smith* 101, 3 Jul. 1929 (DA, FC); pond, Spring Hill, Vigo county, *Smith* 136, 18 Jul. 1929 (DA, FC); Richmond, L. J. *King* 131, 201, 371, Sept., Nov. 1940 (EAR, FC).

WISCONSIN: laboratory culture, University of Wisconsin, Madison, R. *Evans*, 6 Jun. 1949 (FC); bogs near Woodruff, Oneida county, and Sand Lake, Vilas county, G. W. *Prescott* 2W173, 3W279, 4 Jul. 1937, 2 Sept. 1938 (FC). ILLINOIS: Honey lake northeast of Barrington, in Lake county, P. C. *Standley* 92448, 29 Jul. 1945 (FC); salt marsh along creek, Illinois river bottoms 4 miles east of Starved Rock, La Salle county, J. A. *Steyermark* & *Standley* 40632, 4 Jul. 1941 (FC); in swamp in the abandoned quarry at Stony Island avenue and 94th street, Chicago, *Drouet* & H. & J. *Rubinstein* 5798, 23 Aug. 1947 (FC). MISSISSIPPI: in seepage, south shore of Back bay between Keesler Field and d'Iberville bridge, Biloxi, *Drouet* 10012, 15 Dec. 1948 (FC). MINNESOTA: Itasca state park, K. C. *Fan* 10395, 24 Jun. 1954 (D). IOWA: culture from the alkaline fen at Silver Lake, J. D. *Dodd*, 3 Jul. 1953 (FC). MISSOURI: in a jar of water in the greenhouse, University of Missouri, Columbia, *Drouet* 292, 24 Nov. 1928 (D); in salt water about the springs, Chouteau Springs, Cooper county, *Drouet* & H. B. *Louderback* 5648a, 25 Aug. 1945 (FC). LOUISIANA: in pools and shallow water, north shore of Lake Charles, Lake Charles, *Drouet* 8754, 8766, 28 Oct. 1948 (FC). NEBRASKA: shallow water, sandpit lakes, Fremont, Dodge county, W. *Kiener* 14657, 23 Jul. 1943 (FC, KI); cultures from floodplain pond southeast of Grand Island, *Kiener* 1636a,b, Apr., Jul. 1944 (FC, KI); culture from Lake McConaughy, Ogallala, Keith county, *Kiener* 23020a, 20 Aug. 1948 (FC, KI); drainage ditch, Kingsley dam, Ogallala, *Kiener* 24079, 31 Jul. 1948 (FC, KI); swampy bank of Whitehorse creek 5 miles north of North Platte, *Kiener* 17504, 1 Sept. 1944 (FC, KI). TEXAS: limestone grotto near Blowout, Blanco county, F. B. *Plummer* & F. A. *Barkley* 200, 20 Jun. 1943 (FC, TEX); Tornillo creek about 1 mile north of Hot Springs, Brewster county, E. *Whitehouse* 24640, 24 Dec. 1950 (FC); in ditch, municipal water plant, Brownsville, R. *Runyon* 3917a, 17 Jan. 1945 (FC); in seepage below sewage-disposal lake at Camp Barkeley, Taylor county, W. L. *Tolstead* 7751, 29 Jan. 1944 (FC); pool, Austin, F. A. *Barkley* 44a1g22, 22 Jul. 1944 (FC), TEX). MONTANA: spring, Stillwater county, F. H. *Rose* 4029, 4056, Sept. 1940 (FC). COLORADO: siliceous ledge, South Colony creek, Custer county, W. *Kiener* 10393, 9 Jul. 1941 (FC, KI). UTAH: Steam Mill lake, Cache county, G. *Piranian*, 13 Aug. 1933 (FC); Zion canyon, Washington county, N. E. *Gray* 68, 13 Aug. 1941 (FC). ARIZONA: Cliff spring, north rim, Grand Canyon national park, Mohave county, *Gray* 53, Aug. 1941 (FC); in an irrigation pool on the campus, University of Arizona, Tucson, *Drouet*, D. *Richards*, D. M. *Crooks*, L. *Benson*, & R. *Darrow* 2783, 30 Oct. 1939 (FC). ALBERTA: in a warm pool below the main spring, Banff, H. M. *Richards* 6, 23 Aug. 1900 (FC, UC). NEVADA: in water, Sodaville, I. *La Rivers* 1792, 9 Jun. 1953 (FC); swamp 9 miles north of Glendale, Clark county, G. *Piranian*, 6 Apr. 1934 (FC). BRITISH COLUMBIA: with *Coccolchloris aeruginosa* (Näg.) Dr. & Daily in wet moss near Glacier, W. R. *Taylor* 10, Aug. 1921 (FH). WASHINGTON: Whidbey island, W. A. *Setchell* & N. L. *Gardner* 472 (UC).

CALIFORNIA: culture from an aerating tank, West Berkeley, Alameda county, N. L. *Gardner* 6745, 6 Oct. 1931 (FC, UC); campus, University of California, Berkeley, *Gardner* 3219, 3220, Jan. 1916 (UC); culture from soil on the University campus, Berkeley, *Gardner* 6758, 7 Jan. 1933 (FC, UC); water culture, botanical laboratory, University of California, Berkeley, N. L. *Gardner*, Jan. 1916 (as *Chroococcus turgidus* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2202a, FC, L, MICH, TA), Mar. 1916 (as *C. turgidus* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2202b, FC, D, L, MICH, TA); banks of Bear creek, Colusa county, J. F. *Macbride* & H. L. *Mason* 8018, 29 Sept. 1946 (FC); in stagnant water, Keough hot springs, Inyo county, M. J. *Groesbeck* 399, 7 Jul. 1941 (FC); stream in Gnome's Workshop, Death Valley, Inyo county, *Groesbeck* 215, 12 Oct. 1940 (FC); in tepid spring, Furnace creek wash, Death Valley national monument, *Groesbeck* 298,

1 Jan. 1941 (FC); first spring south of Triangle spring, Death Valley, J. & H. W. Grinnell 7626, 24 Oct. 1933 (FC, UC); Lagunitas Creek, Marin county, V. Duran 6604c, Jan. 1931 (FC, UC); laboratory culture from Marin county collected by H. E. Parks, Gardner 6586, 6587, 15 Jan. 1931 (FC, UC); in Benton's hot spring near Partzwick, in the northern part of Owen's valley, Mono county, Mrs. Partz, Aug. 1866 (Type of *Chroococcus thermophilus* Wood, PH; isotype, FC); hot springs on side of mountain, Bridgeport, Mono county, Groesbeck 46, 5 Apr. 1940 (FC); large warm pool in the travertine quarry, Bridgeport, Groesbeck 101, 16 Jun. 1940 (FC); culture (from R. Hecker), Hopkins Marine Station, Pacific Grove, M. B. Allen, 29 Jan. 1952 (FC); culture from the geyser, Calistoga, Napa county, Gardner 7247, 20 Apr. 1933 (FC, UC); in rock pools, Laguna, Orange county, Gardner, 27 Nov. 1908 (as *C. turgidus* var. *submarinus* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1551, FC, L. TA); salt marsh and brackish water west of Newport Beach, Orange county, G. J. Hollenberg 1561, 1625, 16 Aug. 1934 (FC); Waterman hot springs, San Bernardino county, W. A. Setchell 1554a, 19 Dec. 1896 (FC, UC); culture from Plath's greenhouse, San Francisco, Gardner 6964, 20 Apr. 1933 (FC, UC); in seepage on a cliff in the canyon of the Sacramento river, Dunsmuir, Siskiyou county, Drouet & D. Richards 4215, 15 Sept. 1941 (FC); in shallow water of the Tule river, Porterville, Tulare county, Drouet & Groesbeck 4449, 4 Oct. 1941 (FC).

BAHAMA ISLANDS: aquarium in Lerner Laboratory, Bimini, H. J. Humm 3a, 4 Apr. 1948 (FC); freshwater lake off Stafford creek, Andros, A. D. Peggs, 22 Aug. 1942 (FC). PUERTO RICO: in Laguna Tortuguero, N. Wille 829e (NY), 849b (Type of *Chroococcus giganteus* var. *occidentalis* Gardn., NY [Fig. 106]), Feb. 1915; on damp earth, Coamo Springs, Wille 288, 304, Jan. 1915 (NY). BRITISH WEST INDIES: Cockburn Harbor, South Caicos, M. A. Howe 5584, Dec. 1907 (D, FH); with *Johannesbaptistia pellucida* (Dick.) Taylor & Dr. in basins of salt works, Cockburn Harbor, South Caicos, Howe 5584b, Dec. 1907 (NY); Bath, Jamaica, C. E. Pease (NY); among various algae, Jamaica, C. E. Pease & E. Butler, Jul. 1900 (as *Chroococcus turgidus* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 571, FC, NY, TA). MEXICO: Sonora: on exposed soil on mountains south of Hermosillo, D. Richards, Drouet, & L. D. Alvarado 584, 2 Nov. 1939 (FC); backwaters of Rio de Sonora, Unión, Hermosillo, Drouet, Richards, & Alvarado 2840, 4 Nov. 1939 (FC), Drouet & Richards 3032a, 24 Nov. 1939 (FC); on tidal flat, Playa Miramar, Guaymas, Drouet & Richards 3123, 5 Dec. 1939 (FC); in a slightly brackish pool by railroad near the station, Empalme, Drouet & Richards 3413, 23 Dec. 1939 (FC). Yucatan: with *Chara Hornemannii*, Progreso, G. F. Gaumer (FC). GUATEMALA: in warm water of hot spring, Baños de San Lorenzo near Tejar, Dept. Sacatepéquez, P. C. Standley 59839a, 14 Dec. 1938 (FC); in springs near Tajumulco, Dept. San Marcos, J. A. Steyermark 36890, 36923, 28 Feb. 1940 (FC). COSTA RICA: in pool, Ojo de Agua, along Pan-American Highway near Cerro Las Vueltas, R. W. Holm & H. H. Illis 1008, 26 Jul. 1949 (FC, MO). PANAMA: in north arm of Gigante bay, Gatun lake, Canal Zone, C. W. Dodge, 9 Aug. 1925 (D, MO).

VENEZUELA: edge of pond, summit of Mount Roraima, Bolívar, J. A. Steyermark 58915, 28 Sept. 1944 (FC); sides of bluff between Cerro San José and Cerro Peonia, Anzoátegui, Steyermark 61567, 20 Mar. 1945 (FC); hot springs near La Toma, southeast of Cumaná, Sucre, Steyermark 62858a, 21 May 1945 (FC). BRAZIL: Pará: on mud along creek in Bosque Rodriguez Alves, Belém, Drouet 1304, 8 Jul. 1935 (D); on water plants, Lagôa Agua Preta, Belém, Drouet 1531, 29 Jun. 1935 (D); in reservoir 1 km. northeast of Santa Izabel, east of Belém, S. Wright 1612, 10 Jul. 1935 (D). Ceará: in lake at Maracanahú, Maranguape, Drouet 1416, 13 Sept. 1935 (D); in a pool in Rio Pacoty at Fortaleza—Recife road, Pacaruba, Drouet 1503, 24 Nov. 1935 (D); in pool below dam, Açude Bôa Agua, Quixadá, Drouet 1404, 2 Sept. 1935 (D). ECUADOR: in an inland salt pool near Albemarle point, north end of Isabela island, Galapagos islands, W. R. Taylor 123, 12 Jan. 1934 (D, TA). PERU: Laguna Saraja, Dept. Ica, A. Maldonado 93a, Feb. 1942 (FC); Cuistalima, Lago Chilca, Maldonado 65a, Jan. 1942 (FC); Las Delicias, Trujillo, N. Ibañez H. "I", 18 May 1952 (FC).

HAWAIIAN ISLANDS: in paludibus montis Mauna Koa, Hawaii, S. Berggren, 1875 (as *C. turgidus* in Witr. & Nordst., Alg. Exs. no. 250, S). MARSHALL ISLANDS: on outer reef and in channel, Amen island, Bikini atoll, R. F. Palumbo Y28, 27 Jul. 1949 (FC); water in bottom of bomb-crater, Utririk island, Utririk atoll, D. P. Rogers 1780, 2 Sept. 1946 (FC, NY); Igurin island, Eniwetok atoll, W. R. Taylor 46-316, 22 May 1946 (FC, MICH). SOCIETY ISLANDS: moist rocks, cliffs near Huau, Tahiti, W. A. Setchell & H. E. Parks 5119, 5 Jun. 1922 (FC, UC). GILBERT ISLANDS: freshwater pit and brackish water pool, North island, Onotoa, E. T. Moul 8166, 8346, Jul., Aug. 1951 (FC); in taro pit, southern fish-ponds of Nikunau, Mrs. R. Catala 18a, Jul. 1951 (FC). PHILIPPINES: embankment of stream at San Isidro, Puerto Galera, Mindoro, G. T. Velasquez 952, 23 Apr. 1941 (FC); Big Balatero, Puerto Galera, Mindoro, Velasquez 10, 6 May 1953 (FC, PUH); from Mr. Vincent's yard, Jolo, Sulu archipelago, Velasquez 3252, 22 May 1952 (FC, PUH). INDONESIA: kleine poel ten noorden van Kampong Gersik Poetih, Madoera island, L. G. M. Baas-Becking, Aug. 1936 (L); plankton of Lake Ohoitiel, Kai islands, H. Jensen & O. Hagerup, 1922 (Type of *Chroococcus turgidus* var. *maximus* Nygaard, in the private slide collection of G. Nygaard). CHINA: Lungchi bridges, Nanzschwan, Szechwan, H. Chu 716, 7 Aug. 1945 (FC).

6. *ANACYSTIS AERUGINOSA* Drouet & Daily, Lloydia 11: 77. 1948. *Palmogloea aeruginosa* Zanardini, Mem. R. Ist. Veneto 17: 162. 1872. *Gloeocapsa Zanardinii* Hauck, Oesterr. Bot. Zeitschr. 27: 230. 1877. *Aphanocapsa Zanardinii* Hansgirg, Oesterr. Bot. Zeitschr. 39: 6. 1889. —Type from Sarawak (FI). FIG. 110.

Chroococcus Raspaigellae Hauck, Hedwigia 27: 16. 1888. *Aphanocapsa Raspaigellae* Frémy in Feldmann, Arch. de Zool. Exp. & Gén. 75(Jubelaire, Fasc. 25): 389. 1933. —Type from Zaule, Trieste (L). FIG. 112.

Chroococcus smaragdinus Hauck, Hedwigia 27: 15. 1888. *Aphanocapsa smaragdina* Hansgirg, Oesterr. Bot. Zeitschr. 39: 6. 1889. —Type from Isola, Trieste (L). FIG. 108.

Aphanocapsa Howei Collins in Britton & Millspaugh, Bahama Fl., p. 618. 1920. —Type from Watling island, Bahama islands (NY). FIG. 109.

Aphanocapsa Feldmannii Frémy in Feldmann, Arch. de Zool. Exp. & Gén. 75(Jubelaire, Fasc. 25): 395. 1933. —Type from Banyuls sur Mer, France (NY). FIG. 113.

Aphanocapsa sesciacensis Frémy, Bull. Mus. d'Hist. Nat. Paris 34: 383. 1928. —Type from Chausey islands, France (NY). FIG. 111.

Chroococcus sonorensis Drouet & Daily, Field Mus. Bot. Ser. 20: 127. 1942. —Type from Guaymas, Mexico (FC).

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Coelosphaeriopsis halophila Lemmermann, Abh. Nat. Ver. Bremen 16: 353. 1899. *Coelosphaerium halophilum* Geitler in Pascher, Süswasserfl. 12: 102. 1925.

Gloeocapsa endocodia Vouk, Rad Jugoslav. Akad. Znan. i Umjetn. Zagreb, Mat.-Prirod. Razr., 254(79): 6. 1936.

Plantae pallide aeruginosae, roseae, violaceae, vel decoloratae, primum microscopicae demum bullosae ad plura centimetra crassae, cellulis in divisione binis depresso—sub-sphaericis, aetate provecta globosis diametro 6—12 (aut minoria) μ crassis, sine ordine aut in seriebus eucapsoides per gelatinum vaginale distributis; gelatino vaginale hyalino, homoganeo nonnumquam indistincte lamelloso, evidenter limitato vel (saepè omnino) diffuente; protoplasmate pallide aerugineo, roseo, vel violaceo, homoganeo vel sparse tenui-granuloso. FIGS. 108—113.

In brackish and more or less quiet marine waters, often forming gelatinous masses on rocks, wood, larger plants, and attached animals. Plants from deeper waters are usually more roseate in color than those developing near the surface. Young microscopic plants are often very similar to growth forms of *Anacystis thermalis*. In some cases where the plants grow as strata on rocks or other algae, the plants look as if they might have been produced by the hydrolyzation of the superficial layers of *Entophrysalis deusta* or *E. conferta*.

Specimens examined:

JUGOSLAVIA: in Meere an Steinen, Parenzo, Istrien, F. Hauck, Sept. 1875 (L). TRIESTE: Zaule, [C von Marchesetti] (Type of *Chroococcus*? *Raspaigellae* Hauck, L [Fig. 112]); in der Rindenschichte von *Raspaigella brunnea* O. Schm. bei Zaule, A. Valle, Aug. 1887 (as *C. Raspaigellae* in Hauck & Richt., Phyk. Univ. no. 242, D, L, MIN); Isola, Hauck, Sept. 1887 (Type of *C.?* *smaragdinus* Hauck, L). NETHERLANDS: along the Krabbekreek northwest of Oud-Vossemer, isle of Tholen, Zeeland, W. G. Beeltink 99, 11 Jul. 1952 (FC, L). FRANCE: Iles Chausey, G. Frémy, 25 Aug. 1926 (Type of *Aphanocapsa sesciacensis* Frémy, NY [Fig. 111]); dans une mare littorale, Ile aux Oiseaux, Iles Chausey, Frémy, Aug. 1926 (isotypes of *A. sesciacensis* Frémy in Hamel, Alg. de Fr. no. 56, FC, MICH); dans l'éponge *Hircinia variabilis* O. Schm., Banyuls-sur-Mer, Pyrénées Orientales, J. Feldmann (Type of *A. Feldmannii* Frémy, NY [Fig. 113]); isotype, S); Le Croisic, G. Thuret, 2 Aug. 1856 (FH, L); sur les Cladophorae à haute mer, Cherbourg, Bornet, 2 Aug. 1856 (FH, MICH); ad Cladophoras marinas parasitica, Cherbourg, Thuret, 2 Aug. 1856 (D, L, S, YU). BELGIAN CONGO: gelatinous crusts in salt water, J. J. Symoens 440 (FC). BERMUDA: on Penicillus in shallow water, Mangrove lake, Hamilton island, A. J. Bernatowicz 50-168, 17 Nov. 1950 (FC). MAINE: on Rhodymenia, Cape Rosier, Hancock county, F. S. Collins 3 (FH); Kennebunkport, Collins, Jul. 1883 (NY); on Rhodymenia, Spectacle island, Penobscot bay, Collins

2990, 2 Sept. 1895 (NY, UC). MASSACHUSETTS: on *Zostera*, East Falmouth, *Collins* 4, Jul. 1882 (FH); on *Zostera*, Little Harbor, Woods Hole, *W. Trelease*, 1 Aug. 1881 (FC, NY); rocks, entrance of Hadley Harbor, Naushon island, *W. R. Taylor*, 11 Jul. 1931 (D, TA); Menauhant, *Collins*, Jul. 1882 (NY), *G. W. Perry*, Aug. 1882 (NY); Eastham, *Collins* 6118, Sept. 1909 (NY); Gloucester, *W. G. Farlow* (MICH). RHODE ISLAND: Newport, *Farlow* (as *Polycystis pallida* in *Farl.*, *Anders.*, & *Eaton*, *Alg. Am. Bor. Exs.* no. 179, FC, FH, MICH, NY, UC). FLORIDA: Piney point, Tampa bay, Pinellas county, *H. J. Humm* 1, 2 Apr. 1946 (FC); Biscayne bay, Cutler, Dade county, *Humm* 11, 13 Jan. 1946 (FC); saline pool, southeast hammock, Big Pine key, Monroe county, *E. P. Killip* 42479, 7 Jan. 1953 (FC, US); 0.5 mile off Shell Point, Wakulla county, *J. Morrill*, 11 Sept. 1954 (D, T).

CALIFORNIA: San Diego, *D. Cleveland* 149 (FC); Pacific Beach, *M. S. Snyder* (UC); on *Chaetomorpha*, La Jolla, *M. S. Snyder*, 5 Nov. 1898 (as *Anacystis elabens* in *Coll.*, *Hold.*, & *Setch.*, *Phyc. Bor.-Amer.* no. 2251, FC, NY, TA). BAHAMA ISLANDS: in 3 dm. of water in salt lake and the lagoon, Watling island, *M. A. Howe* 5091 (Type of *Aphanocapsa Howe* *Coll.*, NY [Fig. 109]; isotypes, D, UC), 5092, 5100, 25 Nov. 1907 (NY); Waterloo lake near Nassau, *Howe* 3068, Apr. 1904 (NY); bay bottom opposite Lyon's estate, Bimini island, *H. J. Humm* 26, 1 Apr. 1948 (FC); pilings, Lerner Laboratory pier, Bimini, *Humm* 20, 27 Mar. 1948 (FC). PUERTO RICO: on Halodule, Condado lagoon, San Juan, *H. L. Blomquist* 12109, 31 Oct. 1941 (FC). GUADELOUPE: Les Saintes, dragué entre Terre de Haut et l'îlet à Cabrit, *J. Feldmann* 3391 bis, Mar. 1936 (TA). MEXICO: in brackish water near the beach 4 km. east of Guaymas, Sonora, *Drouet & D. Richards* 3296 (FC), 3298 (Type of *Chroococcus sonorensis* *Dr. & Daily*, FC), 16 Dec. 1939. ECUADOR: in mangrove swamps on southeast side of Narborough island, Galapagos islands, *J. T. Howell* 575, 1 Jun. 1932 (FC, UC). SOCIETY ISLANDS: rocks in 1 foot of water, Tufaehau, at southernmost tip of Mehetia, *M. L. Grant* 4667, 4773, 15 Dec. 1930 (FC, UC). PHILIPPINES: on sponge, Puerto Princesa, Palawan, *R. C. McGregor*, Oct. 1925 (FC, UC); Tangalan and Small Balatero coves, Puerto Galera, Mindoro, *G. T. Velasquez* 1671, 1880, 5 May 1948, 11 May 1949 (FC, PUH). SARAWAK: [Tangion Datu] ad Sargassa, *E. Beccari* (Type of *Palmogloea aeruginosa* *Zanard.*, FI; isotype, L [Fig. 110]). INDONESIA: Saleyer, *A. Weber-van Bosse* 1149, Jan. 1889 (FC, L). AUSTRALIA: on rock near beach, Curl Curl near Sydney, *V. May* 1158, 1 Dec. 1945 (FC); culture, Marion bay, South Australia, *L. G. M. Baas-Becking*, Aug. 1937 (L).

7. ANACYSTIS THERMALIS (Menegh.) Dr. & Daily.

Plantae aeruginaeae, olivaceae, luteolae, violaceae, vel roseae, praecipuius microscopicae, cellulisi in divisione binis depresso—sub-sphaericis (raro truncato-hemisphaericis), aetate provecta globosis, diametro (4—)6—12 μ crassis, sine ordine vel in seriebus eucapsoides per gelatinum vaginale distributis; gelatino vaginale hyalino, homoganeo vel lamelloso, firmo vel (saepe omnino) diffluente; protoplasmate aerugineo, olivaceo, luteolo, violaceo, vel roseo, homoganeo vel granuloso. FIGS. 114—132.

Key to forms of *Anacystis thermalis*:

- Plants 1—8-celled, sheaths thin and often lamellose, protoplasm usually granular 7a. f. THERMALIS
- Plants 8—128-celled, the cells distributed in more or less cubical (eucapsoid) arrangement within the ample gelatinous matrix, protoplasm usually homogeneous 7b. f. MAJOR

7a. ANACYSTIS THERMALIS f. THERMALIS. *A. thermalis* Drouet & Daily, *Butler Univ. Bot. Stud.* 10: 221. 1952. *Trochiscia thermalis* Meneghini, *Consp. Algol. Egan.*, p. 334. 1837. *Protococcus nudus* Kützinger, *Phyc. Germ.*, p. 145. 1845. *Pleurococcus nudus* Rabenhorst, *Fl. Eur. Algar.* 3: 26. 1868. —Type from the Euganean springs, Italy (PC).

Pleurococcus membraninus Meneghini, *Mem. R. Accad. Torino*, ser. 2, 5 (Sci. Fis. & Mat.): 34. 1843. *Protococcus membraninus* Meneghini in Kützinger, *Tab. Phyc.* 1: 5. 1846. *Chroococcus membraninus* Nägeli, *Gatt. Einzell. Alg.*, p. 46. 1849. *Gloeocapsa membranina* Drouet & Daily in Habeeb & Drouet, *Rhodora* 50: 68. 1948. —Type from the Euganean springs, Italy (FI). FIG. 123.

Pleurococcus cohaerens Brébisson in Meneghini, Mem. R. Accad. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 35. 1843. *Protococcus cohaerens* Kützing, Tab. Phyc. 1: 5. 1846. *Chroococcus cohaerens* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. *Gloeocapsa cohaerens* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 231. 1938. —Type from Falaise, France (PC); cotypes from Euganean springs, Italy (L, UC). FIG. 125.

Protococcus rufescens Kützing, Tab. Phyc. 1: 9. 1846. *Pleurococcus rufescens* Brébisson pro synonym. in Kützing, loc. cit. 1846. *Chroococcus rufescens* Nägeli, Gatt. Einzell. Alg., p. 45. 1849. —Type from Arromanches, Calvados, France (PC).

Protococcus pallidus Nägeli in Kützing, Sp. Algar., p. 201. 1849. *Chroococcus pallidus* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. —Type from Zürich, Switzerland (L). FIG. 129.

Palmella testacea A. Braun in Kützing, Sp. Algar., p. 211. 1849. *Aphanocapsa testacea* Nägeli, Gatt. Einzell. Alg., p. 52. 1849. *Microcystis testacea* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 138. 1938. —Type from Freiburg im Breisgau, Germany (L). FIG. 127.

Chroococcus helveticus Nägeli, Gatt. Einzell. Alg., p. 46. 1849. —Type from Lucerne, Switzerland (FC); paratype from Zürich named by the author (FC). FIG. 114.

Chroococcus decorticans A. Braun, Betracht. ü. d. Erscheinung d. Verjüngung i. d. Natur, p. 194. 1849—50. *Gloeocapsa decorticans* Richter ex Wille, Nyt Mag. Naturvid. 62: 186. 1925. —Type from St. Aubin, Switzerland (L). FIG. 128.

Chroococcus turgidus var. *rufescens* Wartmann in Rabenhorst, Alg. Sachs. 63 & 64: 631. 1857. —Type from Zürich, Switzerland (FC).

Chroococcus virescens Hantzsch in Rabenhorst, Alg. Sachs. 133 & 134: 1332. 1862. *C. minutus* var. *virescens* Hansgirg, Prodr. Algenfl. Böhmen 2: 162. 1892. —Type from Dresden, Germany (L). FIG. 116.

Chroococcus obliteratus Richter in Hauck & Richter, Phyk. Univ. 1: 41. 1886; Hedwigia 25: 215. 1886. *C. minutus* var. *obliteratus* Hansgirg, Prodr. Algenfl. Böhmen 2: 162. 1892. —Type from Leipzig, Germany (L).

Chroococcus minutus var. *salinus* Hansgirg, Oesterr. Bot. Zeitschr. 36: 333. 1886. —Type from Ouzic, Bohemia (W). FIG. 118.

Aphanocapsa salinarum Hansgirg, Physiol. & Algol. Stud., p. 153. 1887. —Type from Ouzic, Bohemia (W). FIG. 118.

Chroococcus membraninus var. *crassior* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 360. 1891. —Type from Tüffer, Slovenia, Yugoslavia (W). FIG. 126.

Chroococcus helveticus var. *aureo-fuscus* Hansgirg, Prodr. Algenfl. Böhmen 2: 162. 1892. —Type from Slichov, Bohemia (W). FIG. 119.

Chroococcus helveticus var. *aurantiofuscescens* Hansgirg, Prodr. Algenfl. Böhmen 2: 162. 1892. —Type from Podmoran, Bohemia (W). FIG. 122.

Chroococcus turgidus var. *glomeratus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 154. 1893. —Type from Kufstein, Tyrol, Austria (W). FIG. 120.

Gloeocapsa calcarea Tilden, Minnesota Bot. Stud., ser. 2, 1: 29. 1898; Amer. Alg. 3: 299. 1898. —Type from Osceola, Wisconsin (MIN). FIG. 124.

Chroococcus polyedrififormis Schmidle, Engler Bot. Jahrb. 30: 241. 1901. —Type from Lake Nyasa, Tanganyika (ZT).

Chroococcus mediocris Gardner, Mem. New York Bot. Gard. 7: 6. 1927. —Type from Laguna Tortuguero, Puerto Rico (NY). FIG. 121.

Chroococcus subsphaericus Gardner, Mem. New York Bot. Gard. 7: 6. 1927. —Type from Coamo Springs, Puerto Rico (NY). FIG. 117.

Chroococcus aeruginosus Gardner, Mem. New York Bot. Gard. 7: 7. 1927. —Type from Coamo Springs, Puerto Rico (NY).

Chroococcus turgidus var. *uniformis* Gardner, Mem. New York Bot. Gard. 7: 7. 1927. *C. turgidus uniformis* Gardner, New York Acad. Sci., Sci. Surv. Puerto Rico 8: 256. 1932. —Type from Coamo Springs, Puerto Rico (NY).

Chroococcus heangloios Gardner, Mem. New York Bot. Gard. 7: 9. 1927. —Type from Umado, Puerto Rico (NY).

Gloeocapsa acervata Gardner, Mem. New York Bot. Gard. 7: 10. 1927. —Type from near Arecibo, Puerto Rico (NY).

Gloeocapsa ovalis Gardner, Mem. New York Bot. Gard. 7: 11. 1927. —Type from near Adjuntas, Puerto Rico (NY). FIG. 115.

Synechocystis crassa var. *major* Geitler, Arch. f. Hydrobiol., Suppl. XII, Trop. Binnengewässer 4: 623. 1933. —Type from Tjurup, Sumatra, Indonesia (in the collection of L. Geitler).

Chroococcus schizodermaticus var. *incoloratus* f. *paucastratosus* Geitler ex J. de Toni, Diagn. Alg. Nov., I. Myxophyceae 9: 833. 1946. —Type from Kuripan, Java (in the collection of L. Geitler).

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Chroococcus rufescens var. *suricensis* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. *C. rufescens* f.

turicensis Nägeli ex Rabenhorst, Fl. Eur. Algar. 2: 33. 1865. *C. turicensis* Hansgirg, Physiol. & Algol. Stud., p. 165. 1887. —Notes and sketches of this were found in the notebooks of Carl Nägeli in the Pflanzenphysiologisches Institut, Eidgenössische Technische Hochschule, Zürich.

Aphanothece globosa Elenkin, Kamchatskaya Eksped. Fiod. Pavlov. Ryakushinskavo, Bot. 2: 151. 1914.

Chroococcus bataviae van Oye, Hedwigia 63: 177. 1921.

Chroococcus cumulatulus Bachmann, Mitt. Naturf. Ges. Luzern 8: 11. 1921.

Chroococcus minutus var. *amethystaceus* Wille, Deutsche Südpolar-Exped. 1901—03, 8: 383. 1924. *C. minutus* var. *amethysteus* Wille ex Geitler, Rév. Algol. 2: 345. 1925.

Chroococcus helveticus var. *consociato-dispersus* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 23. 1923. *Gloeocapsa minuta* f. *consociato-dispersa* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 233. 1938.

Chroococcus Scherffelianus Kol, Folia Crypt. Szeged 1: 614. 1928.

Myxosarcina chroococcoides Geitler, Arch. f. Protistenk. 60: 443. 1928.

Chroococcus irregularis Huber-Pest., Verh. Int. Ver. Theor. & Ang. Limnol. 4: 366. 1929.

Synechocystis crassa Woronichin, Bull. Jard. Bot. Princip. U. R. S. S. 28: 31. 1929.

Chroococcus lithophilus var. *rotae* Gonzalez Guerrero, Anal. Jard. Bot. Madrid 8: 266. 1948.

Myxosarcina sphaerica Proshkina-Lavrenko, Akad. Nauk S. S. S. R. Otd. Sporovykh. Rost. Bot. Mater. 6: 72. 1950.

Plantae aerugineae, olivaceae, luteolae, violaceae, vel roseae, microscopicae vulgo 1—8-cellulares, cellulis in divisione binis depresso—sub-sphaericis (raro truncato-hemisphaericis), aetate provecta globosis diametro (4—)6—12 μ crassis, sine ordine per gelatinum vaginale distributis; gelatino vaginale hyalino, tenue, homogeneo vel lamelloso, firmo vel (etiam omnino) diffuente; protoplasmate aerugineo, olivaceo, luteolo, violaceo, vel roseo, plerumque (saepe grossi-) granuloso. FIGS. 114—129.

Among other algae in seepage and in shallow fresh water, rarely in brackish water. Macroscopic plants of *Anacystis thermalis* f. *thermalis* rarely develop. In brackish water, plants interpreted as of this form may appear to be derived from the superficial cells of *Entophysalis crustacea*.

Specimens examined:

NORWAY: Valdres, in rupibus ad Skogstad, N. Wille, 31 Jul. 1879 (D). SWEDEN: Möja, Uppland, O. Borge, Aug. 1933 (S); in fossa turfosa ad Källstorp par. Holm in Dalia, V. Wittrock, 22 Aug. 1878 (as *Merismopoda glauca* in Witr. & Nordst., Alg. Exs. no. 300, FC); in aquaeductu ad Nacka prope Stockholmiam, Wille, 1884 (D). POLAND: Silesia: an einem eisernen Brunnentropfe in Wüstewaldersdorf, B. Schröder 9, 4 Aug. 1893 (S, UC). GERMANY: Baden: Freiburg, A. Braun, Oct. 1847 (Type of *Palmella testacea* A. Br., L [Fig. 127]; isotypes, L, NY). May 1850 (NY); Karlsruhe, in einem mit Bachwasser angesetzten Kulturtopf, W. Migula, Oct. 1904 (as *Chroococcus minutus* in Mig., Crypt. Germ., Austr., & Helv. Exs., Alg. no. 84, MICH, TA); Badenweiler, Braun 26, Aug. 1848 (L). Saxony: auf Torfmoorschlamme, cultivirt (as *C. minutus* in Rabenh. Alg. no. 1214, FC, L, TA); Dresden, gesammelt im Aug. 1860, cultivirt bis jetzt, C. A. Hantzsch, May 1862 (Type of *C. virescens* Hantzsch in Rabenh. Alg. no. 1332, L; isotypes, FH, NY [Fig. 116], UC); Schönfeld bei Dresden, P. Richter, Aug. 1876 (FC), Aug. 1877 (L), Aug. 1875 (as *C. virescens* in Rabenh. Alg. no. 2533, FC, L, NY, S, TA, UC); étangs, Richter (as *C. virescens* in Roumeguère, Alg. de Fr. no. 506, L); Leipzig, in einem flachen Teller, C. Werner, Sept. 1885 (Type of *C. oblitteratus* Richt. in Hauck & Richt., Phyk. Univ. no. 41, L; isotypes, MICH, MIN). CZECHOSLOVAKIA: Bohemia: Arnau, A. Hansgirg, Jul. 1885 (FC, W); Eichwald, Hansgirg, Jul. 1883 (FC, W); Mühle am Olafgrund im Riesengebirge, Hansgirg, Jul. 1884 (FC, W); in stagnis subsalsis prope Ouzic ad Kralup, Hansgirg (with *Gomphosphaea aponina* Kütz. in Kerner, Fl. Exs. Austro-Hung. no. 3600, MO); in seichtem Wasser und im Schlamme der Salzwassersümpfe bei Ouzic nächst Kralup, Hansgirg, Oct. 1883 (Types of *Aphanocapsa salinarum* Hansg. and *Chroococcus minutus* var. *salinus* Hansg., W; isotype, FC [Fig. 118]); auf feuchten Felsen bei Podmorán, Hansgirg, Jun. 1885 (Type of *C. helveticus* var. *aurantiofuscescens* Hansg., W; isotype, FC [Fig. 122]); in parietibus subhumidis caldarium horti botanici Pragae, Hansgirg, 1883 (as *C. aurantio-fuscus* in Witr. & Nordst., Alg. Exs. no. 700, FC, L, S); Sázaava, Hansgirg, Sept. 1885 (FC, W); Selc u Roztok, Hansgirg, Nov. 1886 (FC, W); in rupibus madidis prope Selc in agro Pragensi, Hansgirg (as *C. helveticus* in Kerner, Fl. Exs. Austro-Hung. no. 2397 I, FC, FH, L, MO, S); auf feuchten Felsen bei Slichow, Hansgirg, May 1885 (Type of *C. helveticus* var. *aureo-fuscus* Hansg., W; isotype, FC [Fig. 119]); St. Prokop ad Tinonicum, Hansgirg, May 1885

(FC, W); skály pod Tetíнем nad Berouňkou, *Hansgirg*, Sept. 1888 (FC, W).

AUSTRIA: Lower Austria: in oppido Baden in receptaculo aquae salientis, *Stockmayer* (as *C. helveticus* in Kerner, Fl. Exs. Austro-Hung. no. 2397 II., FC, FH, L, MO, S); in lacu horti Bar. Doblhoff in oppido Baden, *Stockmayer* (as *C. turgidus* f. *subnudus* in Kerner, Fl. Exs. Austro-Hung. no. 2398 II., FC, FH, L, MIN, S). Tyrol: im Längsee bei Kufstein, *Hansgirg*, 1891 (Type of *C. turgidus* var. *glomeratus* Hansg., W; isotype, FC [Fig. 120]). JUGOSLAVIA: Slovenia: Laak prope Steinbrück, *Hansgirg*, Aug. 1890 (FC, W); in Tüffer im Abflusse der warmen Quelle (im kleinen Wasserbasin), *Hansgirg*, Aug. 1890 (Type of *C. membraninus* var. *crassior* Hansg., W; isotype, FC [Fig. 126]); Veldes, *Hansgirg*, Sept. 1889 (FC, W); Podnart, *Hansgirg*, Aug. 1889 (FC, W). Istria: Pisino, *Hansgirg*, Aug. 1889 (FC, W). Dalmatia: Spalato, *Hansgirg*, Aug. 1889 (FC, W); ad cataractam fluminis Kerkae ad Scardonam, *Hansgirg*, Aug. 1888 (FC, W). SWITZERLAND: Luzern, an nassen Felsen, *K. von Nägeli*, Dec. 1847 (Type of *C. helveticus* Näg., FC; isotypes in Hauck & Richt., Phyk. Univ. no. 483, FH, L); in saxis irrigatis prope Rehald am Zürich, *G. Winter*, Nov. 1878 (as *C. pallidus* in Witttr. & Nordst., Alg. Exs. no. 400, FC, L, NY, S); auf feuchten Tufffelsen, St. Aubin am Neuchâtel See, *A. Braun* 114, 4 Sept. 1848 (Type of *C. decorticans* A. Br., L [Fig. 128]); an einem Brunnen bei Zürich, *Winter*, Aug. 1878 (S); an Felsen, Erlenbacher Tobel, Zürich, *Nägeli*, 10 Sept. 1848 (paratypes of *C. helveticus* Näg., FC [Fig. 114], FH); Zürich, *Nägeli* 304 (Type of *Protococcus pallidus* Näg. [= *Chroococcus pallidus* Näg.], L [Fig. 129]); isotype, UC); an feuchten Felsen bei Zürich, *Wartmann*, Jul. 1856 (Type of *C. turgidus* var. *rufescens* Wartm., FC; isotypes, L, NY). ITALY: Görz, *A. Hansgirg*, 1891 (FC, W); in aquis thermalibus Thermae Euganeae, *Meneghini* (Type of *Trochiscia thermalis* Menegh., PC; isotype, L), *idem* (cotype of *Pleurococcus cohaerens* Bréb., L [Fig. 125]); in fossa del molino [therm. Eugan.], *Meneghini*, Jun. 1838 (Type of *Pleurococcus membraninus* Menegh., FI [Fig. 123]; isotypes, L, S, UC).

NETHERLANDS: Drammensvei, Bergen, *A. Weber-van Bosse* 102, Aug. 1885 (L). FRANCE: Calvados: Arromanches, *Brébisson* ex herb. Lenormand (Type of *Protococcus rufescens* Kütz., FC; isotype, UC); dans une cascade dans les Falaises près d'Arromanches, *A. de Brébisson* (as *P. rufescens* in Rabenh. Alg. no. 2034, FC); Bayeux, *de Brébisson* (S); Falaise, *de Brébisson* (Type of *Protococcus cohaerens* Bréb., PC; isotypes, FI, UC). Seine Inférieure: Falaises d'Etretat, *M. Gomont*, Jul. 1884 (FC). Basses Pyrénées: sur la terrasse d'une maison, *Guéthary*, *C. Sauvageau*, May 1898 (PC). PORTUGAL: Oporto, *I. Newton*, 1887 (as *Aphanocapsa testacea* in Hauck & Richt., Phyk. Univ. no. 331, L). TUNISIA: Gafsa, *M. Serpette* TL45, TL64, 15 Mar. 1948 (D). ALGERIA: Djendel, *F. Debray*, May 1891 (NY). AZORES: in aqua fluente, *K. Bohlin*, Aug. 1898 (as *Chroococcus membraninus* in Witttr., Nordst., & Lagerh., Alg. Exs. no. 1538, L, NY). TANGANYIKA: an Gneissblöcken in der Nähe der Brandung, Langenburg am Nyassasee, *W. Goetze* 867, 23 Apr. 1899 (Type of *C. polyedrifformis* Schmidle, ZT).

ICELAND: in a hot spring, Uxahver, North Amt, *W. F. Palsson* 2, Jul. 1941 (FC). NEW BRUNSWICK: pools and ledges about the falls, Grand Falls, Victoria county, *H. Habeeb* 10264, 10380, 10671, 13455, Jul.—Aug., 1947—1948 (FC, HA); in lake 8 miles south of Grand Falls, *Habeeb* 11653, 22 June 1951 (FC, HA); Island lake, 40—50 miles due south of Dalhousie, *M. Le Mesurier* 1, Aug. 1953 (FC). MASSACHUSETTS: on moss, Magnolia, *W. G. Farlow*, Sept. 1903 (FH). QUEBEC: sur roches, carrière d'Outremont, Mont-Royal, près Montréal, *C. Lanouette* 104, 105, 109, 111, Sept. 1940 (FC). NEW YORK: incrustation on inside of spring barrel near the road culvert of Reed's Creek, Ontario county, *D. Haskins* 49, 1944 (FC). VIRGINIA: on mud in drain on campus of Virginia Polytechnic Institute, Blacksburg, *A. B. Massey*, *E. S. Luttrell*, & *J. C. Strickland* 981, 15 Aug. 1941 (FC, ST). NORTH CAROLINA: in drippings from a wooden tank, Beaufort Chemical Corporation, Lennoxville road, Beaufort, *H. J. Humm*, 25 May 1948 (FC); on wet rocks, Cullasaja gorge, Macon county, *H. C. Bold* H157, 17 Jun. 1939 (FC); on wet rocks, Jackson county, *Bold* H33b, 7 May 1939 (FC). FLORIDA: Sand pond, Alachua county, *J. B. Davis* 19, 8 Oct. 1941 (FC, PC); on soil, Gainesville, *F. B. Smith* 37, 21 Jan. 1942 (FC, PC); Gainesville, *M. A. Brannon* 290, 305, Feb., Aug. 1945 (FC, PC); pond 4 miles west of Olustee, Baker county, *A. M. Scott* 102, 22 Oct. 1947 (FC); Hernando, Citrus county, *Brannon* 383, 20 Oct. 1946 (FC, PC); Marco island, Collier county, *P. C. Standley* 73391, 73529, 19 Mar. 1940 (FC), 92811, 14 Mar. 1946 (FC); salt meadow 20 miles southeast of Naples, Collier county, *J. A. Steyermark* 63165a, 10 Mar. 1946 (FC); wet sand in the greenhouse, Florida State University, Tallahassee, *F. Drouet* & *D. Crowson* 10453, 5 Jan. 1949 (FC, T); limestone canyon, Aspalaga on Apalachicola river, Liberty county, *C. S. Nielsen*, *G. C. Madsen*, & *Crowson* 764, 12 Feb. 1949 (FC, T); floating in brackish pond, Key West, *M. A. Howe* 1736, Nov. 1902 (FH, NY); saline flats, east side of bay, Big Pine key, Monroe county, *E. P. Killip* 41807, 22 Jan. 1952 (FC, US); on flower pots, Orlando, *Brannon* 542, 606, May, Oct. 1948 (FC, PC).

OHIO: dripping cliff, Steam Furnace, Adams county, *M. Britton*, 11 Jun. 1937 (DA, FC); Sugar Creek Pond, Athens county, *A. H. Blicke* & *L. Mann* 50E, 22 May 1941 (DA, FC); water trough, the Plains, Athens county, *Blicke* & *M. Wright*, 10 Jul. 1941 (DA, FC); state hospital ponds, Athens, *Blicke*, 3 Oct. 1940 (DA, FC), and laboratory culture of the same, 1941 (DA, FC); on limestone, Clifton Gorge, Greene county, ex coll. *M. Britton*, 3 Apr. 1937 (DA, FC); Sharon woods, Sharonville, Hamilton county, *W. A. Daily* 307, 12 Jun. 1940 (DA, FC); Addyston pond, Hamilton county, *Daily* 163, 19 Oct. 1939 (DA, FC); reservoirs, Eden park, Cincinnati, *Daily* 412,

415, 3 Jul. 1940 (DA, FC); drain on university campus, Cincinnati, *Daily & R. Kosanke* 454, 11 Jul. 1940 (DA, FC); in quarry pool on Kellys island, Ottawa county, *C. E. Taft* 13, 6 Jul. 1938 (DA, FC); laboratory culture, Marietta College, Marietta, *L. Walp C41117*, Nov. 1941 (FC); on sandstone in quarry near Constitution, Washington county, *H. Noland & F. K. & W. A. Daily* 897, 899—902, 11 Oct. 1941 (DA, FC). KENTUCKY: near Slade, Powell county, *A. T. Cross, J. Tucker, & W. A. Daily* 758, 5 Sept. 1940 (DA, FC); wet rock on U. S. highway 68 near Brooklyn Bridge, Woodford county, *B. B. McInteer* 1137, 1941 (DA, FC). TENNESSEE: ditch west of Clarksville, Montgomery county, *H. Silva* 2080, 18 Mar. 1950 (FC, TENN). MICHIGAN: Little Lake Sixteen, Cheboygan county, *H. K. Phinney* 10M40/2, 13 Jul. 1941 (FC, PHI); bog on U. S. highway 2 south of Rudyard, Chippewa county, *Phinney* 30M41/5, 16 Aug. 1941 (FC, PHI); Sodon lake west of Bloomfield Hills, Oakland county, *S. A. Cain* C-1, 9 Dec. 1947 (FC). INDIANA: on limestone, Scenic Falls, Hartsville, Bartholomew county, *F. K. & W. A. Daily* 1043, 1045, 1047, 1048, 1052, 1058, 11 Oct. 1942 (DA, FC); Lake Shaffer dam, Monticello, Carroll county, *W. A. Daily* 872, 875, 30 Jul. 1941 (DA, FC); in seepage, Lake Freeman, Monticello, *F. K. & W. A. Daily* 889, 1 Jul. 1941 (DA, FC); floating in Lake Cicott near Logansport, Cass county, *F. K. & W. A. Daily* 1022, 10 Sept. 1942 (DA, FC); on wall of Lake McCoy dam near Greensburg, Decatur county, *F. K. & W. A. Daily* 1075, 11 Oct. 1942 (DA, FC); on limestone, North Vernon, Jennings county, *F. K. & W. A. Daily* 910, 1107, 23 May 1942 (DA, FC); on dam in Blue river at Edinburgh, Johnson county, *F. K. & W. A. Daily* 1049, 11 Oct. 1942 (DA, FC); on floor in Pahuds greenhouse, Indianapolis, *F. K. & W. A. Daily* 1179, 20 May 1944 (DA, FC); plankton of White river near the sewage disposal plant, Indianapolis, *C. M. Palmer*, 16 Sept. 1931 (DA, FC); in a jar, Butler University, Indianapolis, *Palmer* 86, 17 Aug. 1926 (DA, FC); on limestone in a quarry south of Bloomington, Monroe county, *F. K. & W. A. Daily* 1009, 7 Sept. 1942 (DA, FC); gravel pit 3 miles north of Ade, Newton county, *F. K. & W. A. Daily* 2559, 28 Aug., 1951 (DA, FC); on limestone above falls in Echo canyon, McCormicks Creek state park, Owen county, *F. K. & W. A. Daily* 1817, 10 Aug. 1947 (DA, FC); Turkey Run state park, Parke county, *Palmer* 15, 20 May 1932 (DA, FC), *W. A. Daily* 1433, 11 May 1946 (DA, FC); on limestone in quarry near St. Paul, Shelby county, *F. K. & W. A. Daily* 1149, 1156, 3 Oct. 1943 (DA, FC); plankton of Lake Wehi, south of Germantown, Wayne county, *F. K. & W. A. Daily* 1461, 1468, 15 Jun. 1946 (DA, FC), *M. S. Markle & L. J. King* 739, 757, 7 Sept. 1942 (EAR, FC); on rocks and walls, Richmond, *L. J. King* 207, 1114, 1940—1943 (EAR, FC).

WISCONSIN: culture, University of Wisconsin, Madison, *R. Evans* B, 9 Dec. 1949 (FC); on boards where spring water drips, Osceola, *J. E. Tilden*, 15 Sept. 1897 (Type of *Gloeocapsa calcarea* Tild., Amer. Alg. no. 299, MIN; isotypes, FC [Fig. 124], L). ILLINOIS: cultures, University of Chicago, Chicago, *P. D. Vorh*, Dec. 1944, 27 Mar. 1945 (FC); Palos Park, Cook county, *L. J. King & J. O. Young*, Spring 1941 (FC); in seepage on spillway, Lake Glendale, Robbinsville recreational area in Shawnee national forest, Pope county, *H. K. Phinney* 973, 14 Jul. 1944 (FC, PHI). MINNESOTA: on moist wall in stone quarry near campus, University of Minnesota, Minneapolis, *G. Lilley*, 21 Nov. 1901 (as *Gloeocapsa rupestris* in Tild., Amer. Alg. no. 599, FC); Elk spring, Itasca state park, *Drouet* 12185, 6 Jul. 1954 (D, MIN). MISSOURI: in a muriatic spring, Kimmswick, Jefferson county, *J. A. Steyermark*, 1 May 1934 (D); in an aquarium, William Jewell College, Liberty, Clay county, *C. J. Elmore*, 20 Feb. 1938 (D); in pond and pool, Thayer, Oregon county, *N. L. Gardner* 1406, 1410, Jul. 1904 (FC, UC); wet concrete about a spring, Chouteau Springs, Cooper county, *P. Drouet & H. B. Louderback* 5645, 25 Aug. 1945 (FC); sandstone cliffs, Mine La Motte, Madison county, *C. Russell* 36, Oct. 1899 (FC, UC). ARKANSAS: artificial lake, Crossett, Ashley county, *M. Thomason* 234, 30 Jun. 1945 (FC). NEBRASKA: culture from pond in state park, Ravenna, Buffalo county, *W. Kiener* 20172b, 1 May 1946 (FC, KI); culture from sandpit north of David City, Butler county, *Kiener* 22391a, 10 Nov. 1947 (FC, KI); culture from rainwater basin, Schickley, Fillmore county, *Kiener* 22350a, 28 Oct. 1947 (FC, KI); culture from floodplain pond southeast of Grand Island, *Kiener* 16396b, 11 Jul. 1944 (FC, KI); cultures from spring, Lonergan creek, Lemoyne, Keith county, *Kiener* 23066—23068, 20 Aug. 1948 (FC, KI); culture from seepage, Blue creek north of Oshkosh, Garden county, *Kiener* 16218c, 4 Nov. 1945 (FC, KI); culture from Gimlet lake, Garden county, *Kiener* 16199c, 4 Nov. 1945 (FC, KI); culture from sandpit southwest of Phillips, Hamilton county, *Kiener* 17200c, 17 Sept. 1945 (FC, KI); culture from roadside ditch 9 miles east of North Platte, *Kiener* 16871, 13 Jul. 1944 (FC, KI); old gravel pit pond south of North Platte, *Kiener* 17957, 4 Nov. 1944 (FC, KI); culture from ice in cut-off pond, Platte river near Cedar Bluffs, Saunders county, *Kiener* 16373b,c, 16 Jul. 1944 (FC, KI). TEXAS: permanent pool, Austin, *F. A. Barkley* 44alg22, 25 Jul. 1944 (FC, TEX); creek, Austin, *B. C. Tharp*, 7 Oct. 1946 (FC, TEX); creek, Bastrop county, *Tharp*, 13 Oct. 1946 (FC, TEX); in water around bathhouse, Hot Springs, Big Bend national park, Brewster county, *E. Whitehouse* 19692, 19 Apr. 1948 (FC); in creek at sulphur well, Palmetto state park near Gonzales, *B. F. Plummer & Barkley* 1, 22 May 1943 (FC, TEX).

MONTANA: culture from flower pot saucer in greenhouse, Montana State University, Missoula, *Barkley* 4848, 14 Oct. 1940 (FC); in hot water, hot springs, Lo Lo, Missoula county, *D. Griffiths*, 17 Sept. 1898 (as *Cibroococcus varius* in Tild., Amer. Alg. no. 600, FC). WYOMING: on rocks, White Elephant Caves, and in lowermost overflow of Cleopatra Terrace, Mammoth hot springs,

Yellowstone national park, W. A. Setchell 1978, 2008, 31 Aug. 1898 (FC, UC). NEW MEXICO: in hot springs, Montezuma (Hot Springs), San Miguel county, Drouet & D. Richards 2545, 2653, Oct. 1939 (FC); warm mineral spring, Jemez Springs, Sandoval county, A. A. Lindsey, 8 Jun. 1947 (FC). UTAH: in edge of pond from artesian well, Old Resort, Utah lake, Utah county, E. Snow D26, 17 Aug. 1930 (FC, UC). ARIZONA: in a lily pool on campus of the University of Arizona, Tucson, Drouet, Richards, D. M. Crooks, L. Benson, & R. Darrow 2774, Oct. 1939 (FC). NEVADA: in cold pool, hot springs, Steamboat, Washoe county, M. J. Groesbeck 293, 25 Nov. 1940 (FC). WASHINGTON: scum on the ground in overflow from a warm spring, Olympic national park, W. B. Cooke, Aug. 1951 (FC); abandoned Epsom salt mine near Seattle, G. Anderson, 2 Jun. 1955 (D). OREGON: in "hot springs" near Madras, Crook county, L. E. Griffin, 23 Apr. 1939 (FC).

CALIFORNIA: edge of "the Lagoon", Niles, Alameda county, W. A. Setchell, 5 Nov. 1898 (as *Chroococcus membraninus* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1201, FC, L, TA); cultivated in the botanical laboratory, University of California, Berkeley, N. L. Gardner, May 1916 (as *C. helveticus* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2201, FC, D), Gardner 7192, 23 Mar. 1933 (FC, UC), Gardner 8041, 24 Mar. 1937 (FC, UC); in a flowerpot in the Agricultural greenhouse, University of California, Berkeley, Gardner 6977, 21 Jan. 1932 (FC, UC), and culture, Gardner 7148, 7 Jan. 1933 (FC, UC); culture from soil in the northwestern part of the campus, University of California, Berkeley, Gardner 6757, 7 Jan. 1933 (FC, UC); Byron hot springs, Contra Costa county, Gardner 7614, 7718, 11 Apr. 1933, 21 Oct. 1933 (FC, UC); culture from Bad Water, Death Valley, R. M. Holman & L. Bonar 7799, 2 Apr. 1933 (FC, UC); cold alkaline stream at Gnome's Workshop, Death Valley, M. J. Groesbeck 295, 1 Jan. 1941 (FC); Nevares Springs near Cow Creek, Death Valley, P. A. Munz 2280.5, 7 Apr. 1937 (FC); in a saline pond about 2 miles north of Buckingham Park, Clear Lake, Lake county, Gardner 7561, 7 Aug. 1933 (FC, UC), and culture, Gardner 7700, 16 Apr. 1934 (FC, UC); culture from seepage in Live Oak canyon, La Verne, Los Angeles county, G. J. Hollenberg 1648, 12 Nov. 1934 (FC); dam in San Dimas canyon near La Verne, Hollenberg 2077a, 20 Apr. 1934 (D); Old El Encino hot springs, Los Angeles county, B. C. Templeton 1a, Jul. 1944 (FC); boiling pools, hot springs formation 2 miles southeast of Bridgeport, Mono county, A. M. Alexander & L. Kellogg, 30 Jun. 1944 (FC); in the travertine quarry, Bridgeport, Groesbeck 42, 101, 257, 342, 469, Apr. 1940—Jul. 1941 (FC); Hot Creek and Geysers, Mono county, Groesbeck 206, 25 Nov. 1940 (FC); culture from north end of beach at Carmel, Monterey county, Gardner 8013, 1 Dec. 1936 (FC, UC); near St. Helena, Napa county, Setchell 1091, Nov. 1895 (UC); at the geyser, Calistoga, Napa county, Gardner 6824, 6976, 22 Aug. 1931 (FC, UC), and cultures, Gardner 6968, 7012, 18 Jan. 1932, 10 Aug. 1932 (FC, UC); culture from an urn in Mountain View cemetery, Oakland, G. J. Hollenberg 8020a, 23 Nov. 1937 (FC, UC); on damp soil on bluff east of Fort point, San Francisco, Gardner 7104a, 25 Nov. 1932 (FC, UC), and culture, Gardner 7104, 26 Mar. 1933 (FC, UC); in a pond by the Art building of the 1915 World's Fair, San Francisco, Gardner 7193, 26 Mar. 1933 (FC, UC); culture from Laguna Salada, San Mateo county (collected by H. E. Parks), Gardner 7445, 4 Aug. 1933 (FC, UC); in shallow water of Tule river, Porterville, Tulare county, Drouet & Groesbeck 4443, 4 Oct. 1941 (FC).

PUERTO RICO: on rocks, Arroyo de los Corchos, Adjuntas to Jayuya, N. Wille 1695, Mar. 1915 (NY); on rocks, wood, walls, etc. in and about the hot spring, Coamo Springs, Wille 287a (Type of *Chroococcus turgidus* var. *uniformis* Gardn., NY), 382a (Type of *C. aeruginosus* Gardn., NY), 384a (NY), 402a (Type of *C. subsphaericus* Gardn., NY [Fig. 117]), 403a (NY), 408 (FC, NY); on limestone, Hatillo to Arecibo, Wille 1390, 27 Feb. 1915 (Type of *Gloeocapsa acervata* Gardn., NY); ditch in a wet field, Ponce, Wille 1670c, Mar. 1915 (NY); on rocks about 20 km. north of Ponce, Wille 1753, 15 Mar. 1915 (D, NY); in Laguna Tortuguero, Wille 831b, Feb. 1915 (Type of *Chroococcus mediocris* Gardn., NY [Fig. 121]); on rocks about 12 km. north of Utuado, Wille 1512 (NY), 1537c (Type of *C. heangloios* Gardn., NY), Mar. 1915; on limestone, Utuado to Adjuntas, Wille 1640 (Type of *Gloeocapsa ovalis* Gardn., NY [Fig. 115]), 1640c₈, Mar. 1915 (NY). MEXICO: in pool by Rio de Sonora, Unión, Hermosillo, Sonora, Drouet & D. Richards 3039, 24 Nov. 1939 (FC). HONDURAS: wet rock, El Quebracho above El Zamorano, Dept. Morazán, P. C. Standley 310, 29 Nov. 1946 (FC); wet bank, Quebrada del Ingenio de los Angeles near Yuscarán, Dept. El Paraíso, Standley, E. D. Merrill, L. O. Williams, & A. Molina R. 4735, 28 Feb. 1947 (FC). NICARAGUA: on rock under trickling water, Sierra de Managua, region of Las Nubes, Standley 8705, 24 May 1947 (FC). PANAMA: rain water in ancient grinding stone, Panama City, G. W. Prescott CZ19, Aug. 1939 (FC); pit at Miraflores Locks, Canal Zone, Prescott CZ67, Aug. 1939 (FC). VENEZUELA: hot springs near La Toma, southeast of Cumaná, Sucre, Steyermark 62858a, 21 May 1945 (FC). BRAZIL: Ceará: in seepage from pond along the beach, Urubú, Fortaleza, Drouet 1327, 27 Jul. 1935 (D, S, UC); in outlet of Agude Choró, Quixadá, Drouet 1399, 1 Sept. 1935 (D). São Paulo: represa, Estação Experimental de Caça e Pesca, Pirassununga, H. Kleerekoper 1, 17 Apr. 1940 (FC); margem do Mogy-Guaçu perto de Cachoeira, Kleerekoper 5, 17 Apr. 1940 (FC). PERU: in a reservior, Malabrigo, Dept. Libertad, A. Maldonado 87, Feb. 1942 (FC, FH); in fresh water, Lago Villa,

Maldonado 40, Jan. 1942 (FC); agua alcalina, Las Delicias, Trujillo, N. Ibañez H. "H", 18 May 1952 (FC).

HAWAIIAN ISLANDS: high up in littoral, Kawela bay, Oahu, C. J. Engard, 23 Nov. 1940 (FC); rocks on cliff, Nuuanu Pali, Honolulu, G. T. Shigueura, 4 Mar. 1939 (FC). SOCIETY ISLANDS: on dripping rocks, cliffs near Huau, Tahiti, W. A. Setchell & H. E. Parks 5123, Jun. 1922 (UC); cliffs near mouth of Papenu river, Tahiti, Setchell & Parks 5350, Jun. 1922 (UC). GILBERT ISLANDS: in southern fish-pond of Nikunau, Mrs. R. Catala 11a, Jul. 1951 (FC). NEW ZEALAND: Wardell stream, Bay of Islands, A. Nash, 27 Jan. 1935 (in Tild., So. Pacific Pl., 2nd Ser., no. 488, FC). PHILIPPINES: in standing water, Cavite street, Manila, G. T. Velasquez 2437, 23 Jul. 1950 (FC, PUH); on dripping wall of race tracks, Santa Ana, Manila, J. D. Soriano 565, 11 Dec. 1949 (FC, PUH); on moist stone wall, Geliños, Sampaloc, Manila, Velasquez 2441, 24 Jul. 1950 (FC, PUH); on concrete pillar, University of the Philippines, Ermita, Manila, Soriano 166, 22 Oct. 1948 (FC, PUH); on exterior walk of the ice plant, Marikina, Rizal prov., Soriano 897, 27 Apr. 1952 (FC, PUH); on wall, San Nicolas, Rizal prov., Soriano 545, 10 Dec. 1949 (FC, PUH); in water at airstrip at Tacloban, Leyte, M. E. Britton 80, 83, 4 Jul. 1945 (FC); on moist sides of public Kiosko in the plaza, Cabatuan, Iloilo prov., Soriano 1112, 16 Nov. 1952 (FC, PUH); on cement floor, Bungao, Tawi-Tawi, Sulu archipelago, Velasquez 3206, 10 May 1952 (FC, PUH). INDONESIA: auf der Oberfläche vom Bach A. Djermih durchflossenes Thermalgebiet östlich von Tjurup, Suban Ajer Panas, Stromgebiet des Musi, Südsumatra, Deutsche Sunda-Expedition, May 1929 (Type of *Synechocystis crassa* var. *major* Geitl., no. M4d in the collection of L. Geitler); Travertin-Hügel von Kuripan, Java, Deutsche Sunda-Expedition, 1928—29 (Type of *Chroococcus schizodermaticus* var. *incoloratus* f. *paucistratosus* Geitl., slide no. BK5c in the collection of L. Geitler). CHINA: on rocks, Omei-shan, Shan-Shan-Kow (Omei), and Thousand Gods Cliff at Nanzechwan, Szechwan, H. Chu 774, 1329, 1329a, Aug. 1941—45 (FC); on rock under dripping water, Hsiang-Shan, Peiping, Hopeh, Y. C. H. Wang 186, 1930—31 (FC, UC); in Kyam spring in Chang-chenmo valley north of Pang-gong Tso, western Tibet, G. E. Hutchinson L58, 20 Jul. 1932 (D). AUSTRALIA: in a dish in glasshouse, Brisbane, Queensland, A. B. Cribb 101, 14 Jun. 1949 (FC); in high littoral pools, Middle River, Kangaroo island, South Australia, H. B. S. Womersley A12664a, KI3488a, 13 Jan. 1950 (FC).

7b. *ANACYSTIS THERMALIS* f. *MAJOR* (Lagerheim) Drouet & Daily, COMB. NOV. *Chroococcus helveticus* f. *major* Lagerheim ex Forti, Syll. Myxophyc., p. 17. 1907. *Gloeocapsa limnetica* f. *major* Drouet & Daily, Lloydia 11: 78. 1948. *A. limnetica* f. *major* Drouet and Daily, Butler Univ. Bot. Stud. 10: 221. 1952. —Type from Praestvandet near Tromsø, Norway (NY). FIGS. 131, 132.

Chroococcus limneticus Lemmermann, Bot. Centralbl. 76: 153. 1898. *C. minutus* var. *limneticus* Hansgirg, Beih. z. Bot. Centralbl. 8(2): 520. 1905. *Gloeocapsa limnetica* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 236. 1938. *Anacystis limnetica* Drouet & Daily, Butler Univ. Bot. Stud. 10: 221. 1952. —Paratype, annotated by W. A. Setchell: "fide Lemmermann", from Lough Neagh, Ireland, designated as the Type (FC).

Chroococcus limneticus var. *subsalsus* Lemmermann, Forschungsber. Biol. Sta. Plön 8: 84. 1901. —Paratype, annotated by W. A. Setchell: "fide Lemmermann", from Lough Corrib, Ireland, designated as Type (FC).

Chroococcus minor var. *dispersus* Keissler, Verh. Zool.-bot. Ges. Wien 52: 311. 1902. *C. dispersus* Lemmermann, Ark. f. Bot. 2(2): 102. 1904. *Gloeocapsa minor* f. *dispersa* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 239. 1938. —Type from Wolfgang-See, Salzburg, Austria (in the collection of C. Keissler, W).

Chroococcus Prescottii Drouet & Daily, Field Mus. Bot. Ser. 20: 127. 1942. —Type from West Falmouth, Massachusetts (D). FIG. 130.

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Chroococcus minutus var. *lacustris* Chodat, Bull. Herb. Boissier 6: 59. 1898.

Chroococcus minutus var. *carneus* Chodat, Bull. Herb. Boissier 6: 180. 1898. *C. limneticus* var. *carneus* Lemmermann, Ark. f. Bot. 2(2): 101. 1904.

Chroococcus purpureus Snow, Bull. U. S. Fish Comm. 1902: 388, 390. 1903. *C. limneticus* var. *purpureus* Tiffany & Ahlstrom, Ohio Journ. Sci. 31: 456. 1931.

Chroococcus limneticus var. *fuscus* Lemmermann, Ark. f. Bot. 2(2): 102. 1904.

Chroococcus limneticus var. *distans* G. M. Smith, Bull. Torr. Bot. Club 43: 481. 1916. *Gloeocapsa limnetica* f. *distans* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 236. 1938.

Chroococcus limneticus var. *elegans* G. M. Smith, Trans. Wisconsin Acad. Sci. 19: 619. 1918.

Chroococcus Gomontii Nygaard, Vidensk. Medd. Dansk Naturh. Foren. Kjøbenhavn. 82: 202. 1926.

Plantae aerugineae, olivaceae, violaceae, vel roseae, microscopicae 8—128-cellulares, libere natantes, cellulae in divisione binis depresso—sub-sphaericis, acetate provecta globosis diametro (4—)6—12 μ crassis, obscure vel crebre in seriebus eucapsoideis per gelatinum vaginale distributis; gelatino vaginale hyalino, homogeneo, amplo; protoplasmate aerugineo, olivaceo, violaceo, vel roseo, homoganeo vel tenui-granuloso. FIGS. 130—132.

In the plankton of lakes and in shallow fresh (rarely brackish) water along their margins. The cubical (eucapsoid) arrangement of the cells is usually evident in plants growing in the limnoplankton, but it is conspicuous in the more compact plants which develop in shallow water.

Specimens examined:

NORWAY: in fossa turfosa ad Praestvandet prope Tromsø, *G. Lagerheim*, May 1894 (Type of *Chroococcus helveticus* f. *major* Lagerh. in Witttr., Nordst., & Lagerh., Alg. Exs. no. 1537, NY; isotype, L [Figs. 131, 132]). SWEDEN: with *Gomphosphaeria Wichurae* (Hilse) Dr. & Daily, Frisksjön, Loftahammar, Smaland, *O. Borge*, Jun. 1914 (S); plankton of Björkesakrasjön, Malmöhus, *B. Carlin-Nilsson* 521, 17 Aug. 1937 (D). GERMANY: in alten Wasserrümpeln, Freiburg im Breisgau, *A. Braun* 28, May 1850 (L). AUSTRIA: Plankton von Aber- oder Wolfgang-See, Salzburg, *C. Keissler*, 1901 (Type of *Chroococcus minor* var. *dispersus* Keissl., slide in the collection of *C. Keissler*, W). IRELAND: Lough Neagh, *W. West* 23, May 1900 (designated as Type of *C. limneticus* Lemm., FC; isotype, UC); plankton, Lough Corrib, *W. West*, with *Gomphosphaeria lacustris* Chod. (designated as Type of *Chroococcus limneticus* var. *subsalsus* Lemm., FC; isotype, UC). SCOTLAND: Lake Shurrery and nearby Loch Chalum, *A. J. Brook* 3, 4, Jul., Sept. 1950 (D); Loch Kinardochy, Perthshire, *Brook* 5, 7 Oct. 1953 (D). NEW BRUNSWICK: in lake 8 miles south of Grand Falls, Victoria county, *H. Habeeb* 11657, 22 Jun. 1951 (FC, HA). MAINE: sink hole, Hollis, *F. C. Seymour*, 11 Sept. 1938 (FC). MASSACHUSETTS: Desmid Haven pond, West Falmouth, *C. M. Palmer* 192, 27 Jul. 1936 (DA, FC), Aug. 1937 (Type of *C. Prescottii* Dr. & Daily, D [Fig. 130]; isotypes, DT, FH, L, NY, S, TA, UC), *H. Croasdale*, Jul. 1935 (D); Woods Hole, 12 Jul. 1935, comm. *J. H. Hoskins* (DA, FC); Tarpaulin pond, Naushon island, *J. M. Furber*, Aug. 1917 (as *C. limneticus* in Coll., Hold., & Setch., Phyc. Bot.-Amer. no. 2252, FC, TA). VIRGINIA: in Hargrove's pond, New Kent county, *M. H. Wood*, 25 Jun. 1939 (FC, ST). FLORIDA: in shallow water, Lake Harris in the municipal park, Leesburg, Lake county, *F. Drower* & *M. A. Brannon* 11064, 19 Jan. 1949 (FC). OHIO: quarry pool near Columbus, *C. E. Taft*, 7 Aug. 1940 (DA, FC).

MICHIGAN: Livingston's bog, Douglas lake region, Cheboygan county, *H. K. Phinney* 28M39-2, 28 Jul. 1939 (FC, PHI); Bryant's bog near Douglas lake, Cheboygan county, *H. A. Gleason Jr.*, Jul. 1935 (TA); plankton of Manistique lake at Emory's resort, Luce county, *Phinney* 9M41/14, 19 Jul. 1941 (FC, PHI). INDIANA: Lake Cicott, Cass county, *F. K. & W. A. Daily* 1024, 10 Sept. 1942 (DA, FC); Indiana lake, 5 miles north of Bristol, Elkhart county, *F. K. & W. A. Daily* 2630, 27 Aug. 1952 (DA, FC); in south end of Lake Wawasee at Johnson's Hotel, Syracuse, Kosciusko county, *F. K. & W. A. Daily* 2190, 2238, Jul. 1950 (DA, FC); in Dewart lake, Kosciusko county, *F. K. & W. A. Daily* 2119, 9 Jul. 1949 (DA, FC); plankton at Maxinkuckee boat landing, Lake Maxinkuckee, Marshall county, *F. K. & W. A. Daily* 1544, 5 Jul. 1946 (DA, FC); Bass lake, 5 miles south of Knox, Starke county, *F. K. & W. A. Daily* 1560, 1566, 6 Jul. 1946 (DA, FC); Lake George, 6 miles north of Angola, Steuben county, *F. K. & W. A. Daily* 1934A, 13 Sept. 1947 (DA, FC); Clear lake, 6 miles east of Fremont, Steuben county, *F. K. & W. A. Daily* 1933A, 2452, 13 Sept. 1947, 17 June 1951 (DA, FC); plankton of Hamilton lake at pier in Circle park, Hamilton, Steuben county, *F. K. & W. A. Daily* 2443, 17 Jun. 1951 (DA, FC); Fox lake, 1 mile southwest of Angola, Steuben county, *F. K. & W. A. Daily* 2487, 19 Jun. 1951 (DA, FC). WISCONSIN: in Pell lake near Lake Geneva, Walworth county, *W. E. Lake*, 29-30 Aug. 1942 (FC). WYOMING: inlet, Half Moon lake, Fremont county, *Bond* F264, 21 Aug. 1934 (FC); Fremont lake, Fremont county, *Bond* F259, F260, Aug. 1934 (FC). PUERTO RICO: in a pool, Mayaguez, *N. Wille* 1318a, Feb. 1915 (NY). BRAZIL: from an open cistern, Campina Grande, Paraíba, *S. Wright* 1593, 28 Aug. 1934 (D). HAWAIIAN ISLANDS: in pools in the swamp of an old crater in the mountains, Kauai, *M. Reed* 11, Aug. 1909 (FC, UC).

GENUS 3. JOHANNESBAPTISTIA

J. de Toni, Noter. Nomencl. Algol. 1: 6. 1934. *Cyanobrix* Gardner, Mem. New York Bot. Gard. 7: 30. 1927; non *Schmidle*, 1897. —Type species: *Cyanobrix primaria* Gardn.

Plantae microscopicae cylindricae elongatae rectae vel curvatae, cellulis discoideis (ad apices depresso-sphaericis) uniseriatim in gelatino vaginale dispositis; divisione cellulae in uno plano ad axem fili perpendicularare procedente; gelatino vaginale hyalino.

In this genus each discoid cell divides only in a plane along the diameter of the disc (perpendicular to the axis of the plant); such cell divisions result in a uniseriate arrangement of cells within a long cylindrical gelatinous matrix.

One species:

1. JOHANNESBAPTISTIA PELLUCIDA W. R. Taylor & Drouet in Drouet, Bull. Torr. Bot. Club 65: 285. 1938. *Hormospora pellucida* Dickie, Journ. Linn. Soc. Bot. 14: 365. 1874. —Type from Fernando de Noronha, Brazil (BM). FIG. 182.

Geminella scalariformis f. *marina* G. S. West in Collins & Hervey, Proc. Amer. Acad. Arts & Sci. 53: 31. 1917. —Isotype from Bermuda (FC).

Cyanobrix primaria Gardner, Mem. New York Bot. Gard. 7: 30. 1927. *Johannesbaptistia primaria* J. de Toni, Noter. Nomencl. Algal. 1: 6. 1934. *J. Gardneri* Frémy, Bull. Soc. Hist. Nat. Afr. du Nord 26: 95, 99. 1935. —Type from Laguna Tortuguero, Puerto Rico (NY). FIG. 184.

Cyanobrix Willei Gardner, Mem. New York Bot. Gard. 7: 31. 1927. *Johannesbaptistia Willei* J. de Toni, Noter. Nomencl. Algal. 1: 6. 1934. —Type from Laguna Tortuguero, Puerto Rico (NY). FIG. 184.

Nodularia? fusca W. R. Taylor, Carnegie Inst. Wash. Papers Tortugas Lab. 25: 48. 1928. —Type from Dry Tortugas, Florida (TA). FIG. 183.

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Hormospora scalariformis G. S. West, Journ. of Bot. 42: 282. 1904. *Geminella scalariformis* G. S. West in Collins, Tufts Coll. Stud. 4(7): 55. 1918.

Cyanobrix Cavanillesii Gonzalez Guerrero, Anal. Jard. Bot. Madrid 6: 250. 1946.

Fila aeruginea vel olivacea, recta vel curvata, ad 1 mm. longa, cellulis discoideis vel sphaerico-discoideis, ad apices filorum rotundis, diametro 3—20 μ crassis, in gelatino vaginale uniseriatim distributis; gelatino vaginale hyalino, homogoeo obscure lamelloso, firmo vel (saepe omnino) diffuente; protoplasmate aerugineo, olivaceo, vel luteolo, homogoeo. FIGS. 182—184.

In shallow brackish, salt, or fresh water; often found among other algae in old marsh pools. Seurat & Frémy in Bull. Soc. d'Hist. Nat. de l'Afrique du Nord 28: 294 (1937) and Frémy & J. de Toni in Atti R. Inst. Veneto Sci., Lett. & Arti 99(2): 401—406 (1940) have contended that plants of *Johannesbaptistia pellucida* are growth-forms of *Lyngbya semiplena* (Ag.) J. Ag. We have been unable to observe any transitional stages between filaments of this species and those of any of the hormogonial Myxophyceae. The absence of *Lyngbya semiplena* from the several inland habitats occupied by *Johannesbaptistia pellucida* seems to give further support to our position that the latter is an autonomous species.

Specimens examined:

JUGOSLAVIA: Salona prope Spalato, Dalmatia, *A. Hansgirg*, Aug. 1889 (FC, W). BERMUDA: spray pool, south shore of Nonsuch island, *A. J. Bernatowicz* 49-307, 15 Mar. 1949 (FC, MICH); tide pool at entrance to Hungry bay, *F. S. Collins*, 23 Apr. 1912 (isotype of *Geminella scalariformis* f. *marina* G. S. West in Coll., Hold., & Setch., Phyc. Bor.-Amer. 2002, FC). MASSACHUSETTS: in a brackish swamp (Chara pond) near Oyster pond, Falmouth, *F. Drouet*, *R. Patrick* & *C. Hodge* 3569, 16 Jul. 1940 (FC). CONNECTICUT: Fresh pond, Stratford, *I. Holden* 1035, Sept. 1894 (D, FH). MARYLAND: in a marsh pool west of Ewell, Smiths island, *P. W. Wolle* & *Drouet* 2307, 26 Aug. 1938 (FC, D, FH); in the salt marsh south of Jenkins creek, Crisfield, *Drouet* & *Wolle* 3630, 3641, 23 Jul. 1940 (FC); marsh pools between Dames Quarter and Chance, Somerset county, *P. W. Wolle*, 30 Sept. 1951 (FC); in pools of brackish water, Jericho marshes west of Fairmount, Somerset

county, Drouet & Wolle 3649, 23 Jul. 1940 (FC). FLORIDA: Long Key, Dry Tortugas, W. R. Taylor, June 1925 (Type of *Nodularia? fusca* W. R. Taylor, TA [Fig. 183]; isotypes, D, N); on mud of sinkhole and marsh near the Inn, Big Pine key, Monroe county, E. P. Killip 41729, 41943, 11 Jan., 18 Feb. 1952 (FC, US); in brackish pool, Marco island, Collier county, P. C. Standley 73407, 19 Mar. 1940 (FC). INDIANA: bottom of Lake Wehi, south of Germantown, Wayne county, F. K. & W. A. Daily 1185, 16 Jul. 1944 (DA, FC). IOWA: pond near shore of Silver lake, J. D. Dodd, 2 Jul. 1953 (D, FC). TEXAS: on sand at Blind bayou, Galveston island, H. K. Phinney 2T41/2, 30 Aug. 1941 (FC, PHI); permanent pool, Austin, F. A. Barkley 44alg27, 25 Jul. 1944 (FC, TEX); southwest tip of lake west of Padre island, 65 miles north of Brownsville, in Kenedy county, J. O. Barry, 27 Sept. 1948 (FC); in a pool of fresh water (seepage from a tank) on a roof, Brownsville, R. Runyon 4207a, 19 Aug. 1946 (FC). CALIFORNIA: in brackish water west of Newport Beach, Orange county, G. J. Hollenberg 1533e, 26 Sept. 1934 (D). BAHAMA ISLANDS: Lake Cunningham, New Providence, A. D. Peggs, 10 May 1941 (FC). BRITISH WEST INDIES: in basins of salt works, Cockburn Harbor, South Caicos, M. A. Howe 5584b, Dec. 1907 (NY). VIRGIN ISLANDS: lagoon, Lindbergh Field, Charlotte Amalie, St. Thomas, W. A. Hoffman 146/593 (D, TA). PUERTO RICO: Laguna Tortuguero, N. Wille 830b (Type of *Cyanobrix primaria* Gardn., NY [Fig. 184]), 830e (Type of *C. Willei* Gardn., NY [Fig. 184]), 5 Feb. 1915. MEXICO: in brackish water of a sand pit on beach 4 km. east of Guaymas, Sonora, Drouet & D. Richards 3297, 16 Dec. 1939 (FC). BRAZIL: in rock pools, Fernando de Noronha, H. N. Moseley on Challenger Expedition (Type of *Hormospora pellucida* Dickie, BM [Fig. 182]). ECUADOR: inland salt pool near Albemarle point, north end of Albemarle island, Galapagos islands, W. R. Taylor 123, 12 Jan. 1934 (D, TA). INDONESIA: binnenmeer van Roesa Linguette, van der Sande, 28 Mar., 21 Jul. 1908 (FC, L).

GENUS 4. AGMENELLUM

de Brébisson, Mém. Soc. Acad. Sci., Art. & Belles-Lettres Falaise 1839: p. 2 of reprint. 1839. —Type species: *Trochiscia quadruplicata* Menegh.

Original specimens of the Type species for the following generic and sub-generic names have not been available to us for study:

Gonidium Ehrenberg ex Meneghini, Linnaea 14: 213. 1849. —Type species: *Gonium glaucum* Ehrenb.

Merismopoedia Kützing, Phyc. Gener., p. 163. 1843. *Merismopoedia* Subgenus *Eumerismopoedia* Ryppowa, Acta Soc. Bot. Polon. 3(1): 45. 1925. —Type species: *M. punctata* Meyen.

Holopedium Subgenus *Euholopedium* Forti, Syll. Myxophyc., p. 110. 1907. —Type species: *Merismopoedia irregularis* Lagerh.

Coccopedia Troitzkaja, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 1: 131. 1922. *Holopedium* Subgenus *Coccopedia* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 66. 1923. —Type species: *Coccopedia limnetica* Troitzk.

Pseudoholopedia Elenkin, Monogr. Algar. Cyanophyc., Pars. Spec. 1: 86. 1938. *Merismopoedia* Subgen. *Pseudoholopedia* Ryppowa, Acta Soc. Bot. Polon. 3(1): 45. 1925. —Type species: *Merismopoedia gigas* Ryppowa.

Plantae (laminae) microscopicae vel macroscopicae, cellulis sphaericis vel ovoideis vel cylindraceutis, in lamina in seriebus regularibus aliis ad alias perpendicularibus dispositis; divisione cellularum seriatim in duobus planis unoquoque ad alia et ad superficiem laminae perpendicularibus procedente; gelatino vaginali hyalino.

In this genus, the plant is a flat or foliose plate in which the cells are arranged in series of rows in two directions at right angles to each other. Cell division proceeds successively in two planes perpendicular to each other and to the surface of the plate.

Key to species of Agmenellum:

Cells 1—3.5 μ in diameter, plants 1—256-celled 1. A. QUADRUPLICATUM
Cells 4—10 μ in diameter, plants larger and often foliose 2. A. THERMALE

1. AGMENELLUM QUADRUPLICATUM Brébisson, Mém. Soc. Acad. Sci., Art. & Belles-Lettres de Falaise 1839: 2 (of reprint). 1839. *Trochiscia quadruplicata*

Meneghini, Consp. Algal. Eugan., p. 334. 1837. *Gonidium quadruplicatum* Meneghini, Linnaea 14: 213. 1840. *Merismopoedia quadruplicata* Trevisan, Nomencl. Algar. 1: 28. 1845. —Paratype from Falaise, France, designated as Type (L).

Trochiscia Prasiola Meneghini, Consp. Algal. Eugan., p. 334. 1837. *Agmenellum Prasiola* Meneghini ex Brébisson, Mém. Soc. Acad. Sci., Art. & Belles-Lettres de Falaise 1839: 2 (of reprint). 1839. *Gonidium Prasiola* Meneghini, Linnaea 14: 214. 1840. *Merismopoedia Prasiola* Trevisan, Nomencl. Algar. 1: 28. 1845. —Isotype from Euganean springs, Italy (W).

Merismopoedia hyalina subsp. *Warmingiana* Lagerheim, Öfvers. K. Sv. Vet.-Akad. Förh. 40(2): 41. 1883. *M. Warmingiana* Lagerheim ex Forti, Syll. Myxophyc., p. 109. 1907. —Type from Kristineberg, Sweden (S).

Merismopoedia punctata f. *minor* Lagerheim, Öfvers. K. Sv. Vet.-Akad. Förh. 40(2): 41. 1883. —Type from Kristineberg, Sweden (S).

Merismopoedia glauca var. *fontinalis* Hansgirg, Sitzungsber. k. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 98. 1891. —Type from Sct. Procop near Prague, Czechoslovakia (W). FIG. 133.

Merismopoedia affixa Richter, Sitzungsber. Naturf. Ges. Leipzig 19—21: 152. 1895; Hedwigia 34: 25. 1895; in Hauck & Richt., Phyk. Univ. 13: 648. 1895. —Type from Kiel, Germany (L).

Merismopoedia minima Beck, Ann. K. K. Nat.-Hist. Hofmus. Wien 12: 83. 1897. —Type from Bombay, India (W).

Merismopoedia elegans var. *remota* G. S. West, Journ. Linn. Soc. Bot. 38: 185. 1907. —Type from Baraka, Tanganyika (FC).

Merismopoedia convoluta f. *minor* Wille in S. Hedin, Southern Tibet 6(3, Bot.): 166. 1922. *M. convoluta* var. *minor* Tiffany & Ahlstrom, Ohio Journ. Sci. 31: 457. 1931. —Type from Pamir (O).

Merismopoedia hyalina f. *salina* Wille in S. Hedin, Southern Tibet 6(3, Bot.): 183. 1922. —Material named by the author from Atjik-bulaks, Tibet, designated as the Type (O).

Holopedium pulchellum Buell, Bull. Torr. Bot. Club 65: 385. 1938. *Microcrocis pulchella* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, 1b: 56. 1942. —The original specimens are reported by Dr. Helen Foot Buell and Dr. Josephine E. Tilden to have been lost. A topotype from the original locality in Minneapolis, Minnesota, has been designated as the Type (FC).

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Gonium tranquillum Ehrenberg, Abh. K. Akad. Wiss. Berlin 1833: 251. 1834. *Gonidium tranquillum* Ehrenberg ex Meneghini, Linnaea 14: 213. 1840. *Agmenellum tranquillum* Trevisan, Prosp. Fl. Eugan., p. 58. 1842. *Merismopoedia tranquilla* Trevisan, Nomencl. Algar. 1: 28. 1845. *Gonium glaucum* Ehrenberg, Infusionsth., p. 58. 1838. *Merismopoedia glauca* Kützinger, Phyc. Germ., p. 142. 1845.

Merismopoedia punctata Meyen, Neues Syst. Pfl.-Physiol. 3: 440. 1839. *M. Kuetzingii* Nägeli, Gatt. Einzeln. Alg., p. 55. 1849. *Sarcina punctata* Meyen ex Bizzozero, Fl. Veneta Crittog. 1: 22. 1885. *Merismopoedia glauca* var. *punctata* Hansgirg, Prodr. Algenfl. Böhmen 2: 142. 1892.

Merismopoedia nova Wood, Proc. Amer. Philos. Soc. 11: 123. 1869.

Merismopoedia paludosa Bennett, Journ. Roy. Microsc. Soc. London, ser. 2, 6: 4. 1886.

Merismopoedia tenuissima Lemmermann, Bot. Centralbl. 76: 154. 1898.

Merismopoedia glauca var. *fontinalis* f. *irregularis* Selk, Jahrb. Hamburg. Wiss. Anstalt 25 (Beih. 3): 49. 1907.

Merismopoedia punctata var. *oblonga* Playfair, Proc. Linn. Soc. New South Wales 19: 135. 1914.

Merismopoedia cyanea Playfair, Proc. Linn. Soc. New South Wales 43: 501. 1918.

Merismopoedia duplex Playfair, Proc. Linn. Soc. New South Wales 43: 501. 1918.

Merismopoedia glauca f. *minor* Häyrén, Bidrag t. Kännedom af Finlands Nat. & Folk 80(3): 92. 1921.

Coccopedia limnetica Troitzkaja, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 1: 131. 1922.

Merismopoedia glauca f. *rosea* Geitler in Pascher, Süßwasserfl. 12: 106. 1925.

Merismopoedia insignis Schkorbatow, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 89. 1923; Arch. Russes de Protistol. 6: 127. 1927. *M. glauca* f. *insignis* Geitler in Pascher, Süßwasserfl. 12: 106. 1925.

Merismopoedia punctata f. *arctica* Kossinskaja, Acta Inst. Bot. Acad. Sci. U. R. P. S. S., ser. 2, Pl. Crypt. 1: 47. 1933.

Coccopedia turkestanica Kisseliová ex Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 68. 1938. —We have been unable to find the original reference reported by Elenkin: Trav. de l'Inst. d'Ousbekistan de la Médecine Tropicale 1(3): 375. 1931.

Merismopoedia Hausmannii Kufferath, Bull. Soc. Roy. Bot. Belg. 74: 95. 1942.

Holopedium Mutisianum Gonzalez Guerrero, Anal. Jard. Bot. Madrid 6: 243. 1946.

Holopedium Clementei Gonzalez Guerrero, Anal. Jard. Bot. Madrid 6: 243. 1946.

Plantae (laminae) aerugineae, olivaceae, violaceae, vel roseae, rectangulares, 1—256-cellulares, cellulis post divisionem globosis diametro 1—3.5 μ crassis, per gelatinum vaginale laxe vel conferte distributis; gelatino vaginale firmo vel (saepè omnino) diffuente; protoplasmate aerugineo, olivaceo, violaceo, vel roseo, homogèneo vel tenui-granuloso. FIG. 133.

In shallow fresh and brackish water and on mud and wet sand; often seen in the plankton of rivers and lakes. Among the specimens enumerated, there seems to be no good reason to separate a small-celled (ca. 1 μ in diameter) form prevalent especially in the plankton of rivers. It is a common phenomenon to find the sheath material hydrolyzed and the cells completely dissociated. Here the cells are apt to be confused with those of *Anacystis montana*. An occasional pseudovacuo-
le may be observed in the cells of *Agmenellum quadruplicatum*, but all collections seen which are predominantly pseudovacuo-
le prove to be of the bacterium, *Erythroconis littoralis* Oerst.

Specimens examined:

SWEDEN: in arena regionis littoralis ad Kristineberg Bahusiae, G. Lagerheim, Aug. 1882 (Types of *Merismopoedia punctata* f. *minor* Lagerh. and *M. hyalina* subsp. *Warmingianum* Lagerh. with *Holopedium sabulicola* in Witr., Nordst., & Lagerh., Alg. Exs. no. 1549, S; isotypes, L. MIN); Möja, Uppland, O. Borge, Aug. 1933 (S); Vaddö, Uppland, O. F. Andersson, Aug. 1890 (S); Lassby backar, Uppsala, Borge, Sept. 1884 (S). GERMANY: Kieler Förde, T. Reinbold, Aug. 1889 (NY); Kiel, im Salzwasser, Reinbold (Type of *Merismopoedia affixa* Richt. in Hauck & Richt., Phyk. Univ. no. 648, L; isotype, MIN); in einem Gartenbassin in Niederlössnitz bei Kotschenbroda, Dresden, R. Wolny, Nov. 1886 (as *M. irregularis* in Hauck & Richt., Phyk. Univ. no. 146, MIN, MICH); Leipzig, P. Richter (L), um Grimma, Richter (UC); Lössnitzgrund bei Dresden, C. A. Hantzsch (NY); Oberlössnitz bei Dresden in einem Bache, Hantzsch (as *M. violacea* in Rabenh. Alg. no. 857, FC, NY, UC); aus einem Moortümpel bei Bernbruch um Lausigk, Richter, Aug. 1867 (as *M. glauca* in Rabenh. Alg. 2056, UC); Schönfeld bei Dresden, Richter, Aug. 1876 (FC); in Torftümpeln bei Wurzen, Bulnheim, 1857 (as *M. violacea* in Rabenh. Alg. no. 650, FC, L, NY); am Strande auf Wangerooge, Oldenburg, F. T. Kützing, Jul. 1839 (L). CZECHOSLOVAKIA: am schlammige Grunde in Felsenquellen bei Sct. Prokop nächst Prag, A. Hansgirk, May 1890 (Type of *M. glauca* var. *fontinalis* Hansg., W; isotype, FC [Fig. 133]). SWITZERLAND: Bieler See, Kt. Bern, Kützing (L). ITALY: ne'vasi delle piante acquatiche all'Orto Botanico di Pisa, Savi, 1867 (as *Microcystis olivacea* in Erb. Critt. Ital., ser. II, no. 30, L); aq. therm. Euganaei, Meneghini (isotype of *Trochiscia Prasiola* Menegh., W). NETHERLANDS: groene Strand, West Terschelling, J. T. Koster 177, 178, Jul. 1937 (L). FRANCE: *Agmenellum quadruplicatum* Bréb., Falaise, A. de Brébisson (designated here as Type of *Trochiscia quadruplicata* Menegh., L); ruisseau, Falaise, Brébisson 414 (L); Falaise, sur la vase d'un étang desséché, Brébisson (as *Protococcus minutus* var. *caerulescens* in Rabenh. Alg. no. 2035, FC, L, TA); flottant dans les fossés et les flaques des marais spongieux, Falaise, Brébisson (as *Merismopoedia aeruginea* in Rabenh. Alg. no. 1356, MIN, L). TANGANYIKA: with *Anabaena tanganyikae* G. S. West in plankton near Baraka, W. A. Cunningham 240, 24 Feb. 1905 (Type of *Merismopoedia elegans* var. *remota* G. S. West, FC; isotype, UC). UNION OF SOUTH AFRICA: Zeekoe Vlei near Cape Town, Mrs. G. E. Hutchinson 35, 5 Feb. 1928 (D).

MAINE: Long pond, Mt. Desert island, F. S. Collins, July 1900 (NY). MASSACHUSETTS: pond on Naushon island, W. R. Taylor, Jul. 1921 (TA), H. T. Croasdale, 17 Jun. 1934 (D). RHODE ISLAND: Portsmouth, Collins, 14 Jun. 1883 (FC). FLORIDA: Robinson lake, Leesburg, M. A. Brannon 244, 28 Jul. 1944 (FC, PC); 7 miles south of La Belle, Lee county, J. E. Davis 20, 8 Oct. 1941 (FC, PC). OHIO: pond in Lakeview fish hatchery, Cincinnati, W. A. Daily 434, 8 Jul. 1940 (DA, FC); culture in University of Cincinnati greenhouse, Cincinnati, L. Lillick & I. Lee 603, 21 Feb. 1934 (DA, FC); pond at fish hatchery, Newton, Hamilton county, F. Brinley, 29 Oct. 1941 (DA, FC); Big Miami river, North Bend, Hamilton county, R. H. Fink 600, Aug. 1932 (DA, FC); Beaver creek near Celina, Mercer county, J. B. Lackey, 22 Aug. 1940 (DA, FC); above falls, Bear creek east of Foster, Warren county, J. H. Hoskins & Daily 230, 4 Nov. 1939 (DA, FC). KENTUCKY: pond on U. S. highway no. 31 south of Glasgow, Barren county, B. B. McInteer 612, 19 Aug. 1929 (DA, FC); new reservoir at Earlington, Hopkins county, McInteer 592, 16 Aug. 1929 (DA, FC). TENNESSEE: in spring near Cherokee dam, Jefferson county, H. Silva 908, 908a, 25 Jun. 1949 (FC, TENN). MICHIGAN: Bryant's bog and Lancaster lake, near Douglas lake, Cheboygan county, C. E. Taft 42, 80, Jul. 1936 (DA, FC). INDIANA: in lake one mile north of Columbus, Bartholomew county, F. K. & W. A. Daily 1041, 11 Oct. 1942 (DA, FC), 2 miles north of Columbus, W. A. Daily, F. K. Daily, & C. Kenoyer 1162, 19 Sept. 1943 (DA, FC); Lake Papakeechee, Kosciusko county, B. H. Smith 146, 15 Sept. 1929 (DA, FC); Aubendaubee bay,

Lake Maxinkuckee, Marshall county, F. K. & W. A. Daily 1485, 30 Jun. 1946 (DA, FC); in a quarry pond at St. Paul, Shelby county, F. K. & W. A. Daily 1154, 19 Sept. 1946 (DA, FC); Lake James, lower basin, Pokagon state park, Steuben county, F. K. & W. A. Daily 1918A, 12 Sept. 1947 (DA, FC); stream east of Snow Lake, Steuben county, C. M. Palmer B34, Sept. 1933 (DA, FC); Fox Lake, Steuben county, Palmer 1019, Jul. 1933 (DA, FC); pond one mile north of Liggett creek, Vigo county, B. H. Smith 430, 4 Aug. 1930 (DA, FC); pond, Rose Polytechnic Institute, Terre Haute, Smith 120, 3 Jul. 1929 (DA, FC); Wabash river, Vigo county, Smith 406, 15 Aug. 1930 (DA, FC); in muck, north end of Lake Wehi, south of Germantown, Wayne county, F. K. & W. A. Daily 1457, 15 Jun. 1946 (DA, FC); culture from spray pond, Crystal Ice Company, Richmond, L. J. King 34, 22 Aug. 1940 (EAR, FC). WISCONSIN: in Pell lake near Lake Geneva, Walworth county, W. E. Lake, Aug. 1942 (FC). MINNESOTA: in Lake of the Isles lagoon, Minneapolis, M. F. Buell, R. L. Cain, & M. F. Moore C, 26 Jul. 1938 (Type of *Holopedium pulchellum* Buell, FC); Mud Lake Wildlife Refuge, Marshall county, Drouet 12092, 28 June 1954 (D, MIN). IOWA: bottom ooze, Des Moines river, Boone county, W. Starrett 142B, 6 Sept. 1946 (D, FC).

ARKANSAS: in a pond in the fish hatchery, Mammoth Spring, Fulton county, F. Drouet 171, 19 Aug. 1928 (D). NEBRASKA: old gravel pit pond south of North Platte, W. Kiener 17955, 4 Nov. 1944 (FC, KI); plankton in pool, Lincoln, Kiener 16593, 15 May 1944 (FC, KI); in farm tank, Fremont, Dodge county, Kiener 14668, 23 Jul. 1943 (FC, KI). TEXAS: creek below spring near swimming pool, Lampasas, E. Whitehouse 24900, 18 Feb. 1951 (FC); permanent pool, Austin, F. A. Barkley 44alg20, 25 Jul. 1944 (FC, TEX). MONTANA: Logan pass, Glacier national park, 23 Aug. 1934 (FC). CALIFORNIA: Berkeley, N. L. Gardner 1361 (UC), 1698 (FC, UC), Apr. 1904, May 1906; on sandy ground, Lake Merced, San Francisco, Gardner 1107, Jun. 1903 (S; as *Merismopoedia glauca* var. *fontinalis* Hansg. in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1156, FC, L, TA). BAHAMA ISLANDS: freshwater lake off Stafford creek, Andros, A. D. Peggs, 22 Aug. 1942 (FC). PUERTO RICO: in a pool 4 km. north of Mayaguez, N. Wille 1325, 1326a, 1327a, 1329d, Feb. 1915 (NY). COSTA RICA: Laguna del Misterio, al norte de San José, J. M. Orozco C. 53, 1953 (FC). VENEZUELA: moist bases of sandstone bluffs, Parí-tepui, Bolívar, J. A. Steyermark 59871, 6 Nov. 1944 (FC). BRAZIL: Ceará: seepage from pond along beach, Urubú, Fortaleza, Drouet 1327, 27 Jul. 1935 (D); pond at Aroeiras, Quixadá, Drouet 1401, 1402, 2 Sept. 1935 (D); pool below the dam, Açude Cedro, Quixadá, Drouet 1393, 31 Aug. 1935 (D); pool in Rio Pacoty at Fortaleza-Recife road, Pacatuba, Drouet 1503, 24 Nov. 1935 (D). PERU: Cocha Zapote, Rio Pacaya, Bajo Ucayali, dept. Loreto, F. Anceita, Jul. 1947 (FC); Laguna Saraja, dept. Ica, A. Maldonado 93a, Feb. 1942 (FC). FORMOSA: fish pond, Tainan, C. C. Chou, 11 May 1951 (D). TIBET: Atjik-bulaks, S. Hedin, 1 Aug. 1899 (designated as Type of *M. hyalina* f. *salina* Wille in the slide collection of N. Wille, O). PAMIR: S. Hedin 13 (Type of *M. convoluta* f. *minor* Wille in the slide collection of N. Wille, O). INDIA: in Victoria Garten, Bombay, A. Hansgirg (Type of *M. minima* Beck with *Polycystis insignis* Beck in Mus. Vindob. Krypt. Exs. no. 227, W; isotypes, DT, FC, L, S).

2. AGMENELLUM THERMALE (Kütz.) Dr. & Daily, COMB. NOV. *Merismopoedia thermalis* Kützing, Phyc. Gener., p. 163. 1843. *Aphanocapsa thermalis* Brügger, Jahresber. Naturf. Ges. Graubündens, N. F., 8: 244. 1863. *Sarcina thermalis* Kützing ex Bizzozero, Fl. Veneta Crittog. 1: 23. 1885. —Type from Battaglia, Italy (L). FIG. 140.

Merismopoedia elegans A. Braun in Kützing, Sp. Algar., p. 472. 1849. —Since the original material from Freiburg-in-Breisgau (L) contains no plants as described, we have selected as the Type a specimen (L) from Leipzig, Germany, collected and annotated as of this species by the author, FIG. 134.

Merismopoedia aeruginea Brébisson in Kützing, Sp. Algar. p. 472. 1849. *M. convoluta* var. *aeruginea* Rabenhorst, Alg. Sachs. 71—72: 719. 1858. *M. convoluta* b. *aeruginea* Rabenhorst, Fl. Eur. Algar. 2: 58. 1865. —Type from Falaise, France (L). FIG. 136.

Merismopoedia major Kützing, Sp. Algar., p. 472. 1849. *M. thermalis* b. *major* Rabenhorst, Fl. Eur. Algar. 2: 58. 1865. —Type from St. Hilaire, France (L). FIG. 135.

Merismopoedia convoluta Brébisson in Kützing, Sp. Algar., p. 472. 1849. *Pseudoholopedia convoluta* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec., 1: 86. 1938. —Type from Falaise, France (L). FIG. 139.

Merismopoedia elegans var. *marina* Lagerheim, Öfvers. K. Sv. Vet.-Akad. Förh. 40(2): 40. 1883. —Type from Kristineberg, Sweden (S).

Merismopoedia glauca subsp. *amethystina* Lagerheim, Öfvers. K. Sv. Vet.-Akad. Förh. 40(2): 41. 1883. *M. glauca* var. *amethystina* Lagerheim ex Forti, Syll. Myxophyc., p. 107. 1907. —Type from Kristineberg, Sweden (S). FIG. 138.

Merismopoedia sabulicola Lagerheim, Öfvers. K. Sv. Vet.-Akad. Förh. 40(2): 43. 1883. *Holopedium sabulicola* Lagerheim, Nuova Notarisia 4: 210. 1893. *Microcrocis sabulicola* Geitler

in Engler & Prantl, *Natürl. Pflanzenfam.*, ed. 2, lb: 56. 1942. —Type from Kristineberg, Sweden (S).

Prasiola Gardneri Collins, *Phyc. Bor.-Amer.* 24: 1185. 1904. *Merismopoedia Gardneri* Setchell in Gardner, *Univ. Calif. Publ. Bot.* 2: 238, 239. 1906. —Type from Alameda, California (NY). FIG. 141.

Merismopoedia aeruginea f. ovata Wille, *Nyt Mag. f. Naturvidenskab.* 61: 76. 1924. —Type from Husøy, Norway (O).

Merismopoedia Willei Gardner, *Mem. New York Bot. Gard.* 7: 3. 1927. —Type from Mayaguez, Puerto Rico (NY). FIG. 137.

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Merismopoedia mediterranea Nägeli, *Gatt. Einzell Alg.*, p. 56. 1849. *M. glauca f. mediterranea* Collins in Collins, Holden & Setchell, *Phyc. Bor.-Amer.* 31: 1651. 1910. —Nägeli's sketches and notes, from his notebooks in the Pflanzenphysiologisches Institut, Eidgenössische Technische Hochschule, Zürich, are reproduced here: FIG. 142.

Merismopoedia irregularis Lagerheim, *Öfvers. K. Sv. Vet.-Akad. Förh.* 40(2): 43. 1883. *Holopedium irregulare* Lagerheim, *Nuova Notarisia* 4: 209. 1893. *Microcrocis irregularis* Geitler in Engler & Prantl, *Natürl. Pflanzenfam.*, ed. 2, lb: 56. 1942.

Merismopoedia revolutiva Askenasy, *Flora* 78: 1. 1894; Askenasy in Bailey, *Bot. Bull. Queensland Dept. Agric.* 11: 49. 1895.

Merismopoedia elegans var. *ulvacea* Bernard, *Protococc. & Desmid.* d'Eau Douce, p. 51. 1908.

Merismopoedia Terekii Henckel, *Scripta Bot. Horti Univ. Imp. Petropol.* 26: 55. 1908; *ibid.* 27: 120. 1909. *M. solitaria* Henckel, *ibid.* 27: 227. 1909.

Merismopoedia boreocaspica Henckel, *Scripta Bot. Horti Univ. Imp. Petropol.* 26: 55. 1908; *ibid.* 27: 120. 1909.

Merismopoedia caspica Henckel, *Scripta Bot. Horti Univ. Imp. Petropol.* 26: 55. 1908; *ibid.* 27: 120. 1909.

Merismopoedia elegans var. *constricta* Playfair, *Proc. Linn. Soc. New South Wales* 43: 501. 1918.

Merismopoedia elegans var. *major* G. M. Smith, *Bull. Wisconsin Geol. & Nat. Hist. Surv.* 57: 32. 1920. *M. major* Geitler in Pascher, *Süsswasserfl.* 12: 107. 1925. *M. Smithii* J. de Toni, *Archivio Bot.* 15: 290. 1939.

Merismopoedia gigas Ryppowa, *Acta Soc. Bot. Polon.* 3: 46. 1925.

Holopedium dednense Pevalek, *Nuova Notarisia* 1925: 293. 1925.

Merismopoedia elongata Kossinskaja, *Bull. Jard. Bot. Princip. U. R. S. S.* 29: 111, 128. 1930.

Merismopoedia Jeaneli Bachmann, *Zeitschr. f. Hydrol.* 8: 135. 1938.

Eucapsis salina Gonzalez Guerrero, *Anal. Jard. Bot. Madrid* 8: 267. 1948.

Pseudoholopedium convoluta var. *subsalina* Proschkina-Lavrenko, *Akad. Nauk S. S. S. R. Ord. Sporovykh. Rost. Bot. Mater.* 6: 69. 1950.

Plantae (laminac) aerugineae, olivaceae, vel violaceae, primum rectangulares et microscopicae, deinde ad 4 cm. longae ambitu irregulares increscentes, cellulis post divisionem globosis, ovoideis, vel cylindraceis diametro 4—10 μ crassis, 4—20 μ longis, per gelatinum vaginale plerumque conferte distributis; gelatino vaginale hyalino, firmo vel (saepe omnino) diffuente; protoplasmate aerugineo, homogeneo vel tenui-granuloso. FIGS. 134—142.

In shallow fresh, brackish, or salt water or on mud. After considerable restudy of the material at hand, we have come to the conclusion that, if there are two species of Agmenellum, the separation must be made on the basis of size of cells and size and configuration of the plate. In *A. thermale* there appears to be a gradual elongation of the cells in a direction at right angles to the surface of the plate as the plant ages and enlarges. Well developed plants with the cells somewhat disorganized can be mistaken for those of *Microcrocis geminata*. Where the gelatinous matrix has hydrolyzed completely, the single cells can be confused with those of *Anacystis* and *Coccochloris* spp.

Specimens examined:

NORWAY: [i ferskvand paa strandklipperne paa] Husøy, N. Wille, 23 Apr. 1919 (Type of

Merismopoedia aeruginea f. *ovata* Wille in slide collection of N. Wille, O). SWEDEN: in arena regionis littoralis ad Kristineberg Bahusiae, *G. Lagerheim*, Aug. 1882 (Types of *M. sabulicola* Lagerh., *M. glauca* subsp. *amethystina* Lagerh. [Fig. 138], and *M. elegans* var. *marina* Lagerh., as *Holopedium sabulicola* in Witt., Nordst., & Lagerh., Alg. Exs. no. 1549, S; isotypes, MIN, L); in fossa turfosa ad Källstorp par. Holm in Dalia, V. Wittrock, 22 Aug. 1878 (as *Merismopoedia glauca* in Witt. & Nordst., Alg. Exs. no. 300, FC, L, S; in Aresch., Alg. Scand. Exs., Ser. Nov., no. 430, FC, L, S). GERMANY: auf Elbschlamm kultivirt, *Reiniche* (as *M. convoluta* var. *aeruginosa* in Rabenh. Alg. no. 719, FC, L, MIN, UC); Eisenach, Teich am Weg nach der Elfengrotte, *W. Migula*, Aug. 1930 (as *M. glauca* in Mig., Krypt. Germ., Austr., & Helv. Exs., Alg. no. 263, FC, TA); Leipzig, in dem grossen Lautzcher Teiche, *O. Bulnheim*, Mar. 1856 (as *M. elegans* in Rabenh. Alg. no. 515, FC, FH, L, NY, UC); Leipzig, *A. Braun*, May 1856 (designated as Type of *M. elegans* A. Br., L [Fig. 134]; isotype, S), *P. Richter*, Jun. 1877 (S), Jul. 1877 (L); Leipzig, um Lausigk, *Richter*, 1867 (as *Chroococcus cohaerens* in Rabenh. Alg. no. 1852, L, NY, UC); Ransnitz bei Leipzig, *Richter* (as *Merismopoedia convoluta* in Hauck & Richt., Phyk. Univ. no. 682, L, S). AUSTRIA: in einer Quelle in der Längepiesting, Lower Austria, *G. de Beck* 367, May 1883 (FC, W). ITALY: auf dem Badenwasser von Battaglia, *Meneghini* (Type of *M. thermalis* Kütz., L [Fig. 140]). SCOTLAND: Loch Shurrery, Caithness, *A. J. Brook* 3, 12 Sept. 1950 (D). ENGLAND: edge of River Coln, Fairford, Gloucestershire, *W. L. Tolstead* 8451, 13 Sept. 1944 (FC). NETHERLANDS: Goes, *van den Bosch* 362 (L). FRANCE: Jardin des Plantes, Paris, *M. Gomont*, May 1888 (NY, DT); Falaise, herb. Lebel (FC), *A. de Brébisson* (S), *Brébisson* 415 (Type of *M. convoluta* Bréb., L [Fig. 139]; isotype, UC); dans les flaques d'un étang abandonné, Falaise, de Brébisson (as *M. convoluta* in Rabenh. Alg. no. 1355, L, MIN; as *M. convoluta* var. *aeruginosa* in Roumeguère, Alg. de Fr. no. 617, L); St. Hilaire, herb. Lenormand (Type of *M. major* Kütz., L [Fig. 135]); eaux saumâtres, parcs d'huitres du Calvados, de Brébisson 448 (Type of *M. aeruginea* Bréb., L [Fig. 136]); eaux saumâtres des environs de Brest, *MM. Crouan* (as *M. glauca* in Desmaz., Pl. Crypt. Fr., ed. 2, no. 301, FC, UC). BRITISH TOGOLAND: Keta, *G. W. Lawson* A515, 30 Dec. 1952 (D).

MAINE: Long pond, Mt. Desert island, *F. S. Collins* 3964, Jul. 1900 (NY). MASSACHUSETTS: near Linden station, Malden, *Collins* 2074 (NY, UC), 2727 (NY), Jun. 1891, Oct. 1895; fresh water and mud, Woods Hole, *W. Trelease*, 1881 (MO). QUEBEC: in the St. Lawrence river, Longueuil near Montreal, *J. Brunel* 33, 30 Aug. 1930 (FC). NEW YORK: Van Cortlandt park, New York city, *J. Cohn* 108, 1933 (D). MARYLAND: in the Potomac river, Plummers island west of Cabin John, Montgomery county, *F. Drouet*, *E. P. Killip*, & *D. Richards* 5533, 6 Aug. 1944 (FC, US). FLORIDA: intertidal in St. Andrews bay, Cove Hotel, Panama City, *Drouet* & *C. S. Nielsen* 11625, 30 Jan. 1949 (FC, T); Dunnellon, Marion county, *M. A. Brannon* 380, 20 Oct. 1946 (FC, PC); in a very shallow stream near Tallahassee, *Nielsen* 48a, 2 May 1948 (FC, T); Cocoplum beach, Biscayne bay, Miami, *H. J. Humm* 2, 14 Jan. 1946 (FC); swamp 8 miles north of Sanderson, Baker county, *A. M. Scott* 149, 2 Jan. 1948 (FC). KENTUCKY: pond at St. Vincent, Union county, *B. B. McInteer* 970, 26 Jun. 1938 (DA, FC); pond on U. S. highway 60 one mile east of Winchester, Clark county, *McInteer* 673, 23 Aug. 1929 (DA, FC). TENNESSEE: Knoxville, *H. C. Bold* 6a, Jul. 1938 (FC). MICHIGAN: Livingston bog, Douglas lake, Cheboygan county, *H. K. Phinney*, 28 Jul. 1939 (DA, FC, PHI). INDIANA: in muck from North Mud lake 3 miles northeast of Fulton, *F. K. & W. A. Daily* 1473, 29 Jun. 1946 (DA, FC); artificial lake north of Marion, Grant county, *F. K. & W. A. Daily* 2657, 23 Aug. 1953 (DA, FC); in Tippecanoe lake, 2½ miles from North Webster, Kosciusko county, *F. K. & W. A. Daily* 2229, 25 Jul. 1950 (DA, FC); debris on bottom of Messick lake, 1½ miles north of Eddy, Lagrange county, *F. K. & W. A. Daily* 2690, 26 Aug. 1953 (DA, FC); Lake Sullivan in Riverside park, Indianapolis, *F. K. & W. A. Daily* 1035, 27 Sept. 1942 (DA, FC); Morgan county, *C. M. Palmer* M2, 5 Oct. 1925 (DA, FC); pond on state road no. 41, 2 miles north of Rockville, Parke county, *F. K. & W. A. Daily* 1879, 16 Aug. 1947 (DA, FC). MISSOURI: culture from mud in the lake north of Chouteau Springs, Cooper county, *F. Drouet* 562, 27 Apr. 1930 (D). LOUISIANA: roadside pool near Bastrop, *G. W. Prescott* La25, 26 Jun. 1938 (D). NEBRASKA: old gravel-pit pond south of North Platte, *W. Kiener* 17956, 17957, 4 Nov. 1944 (FC, KI); Dewey lake, Cherry county, *E. Palmatier* & *T. R. Porter* 13775, 28 Jun. 1936 (FC, KI). TEXAS: on sand at Blind Bayou, Galveston island, *H. K. Phinney* 2T41/2, 30 Aug. 1941 (FC, PHI); in a stream, Travis county, *B. C. Sharp* 46A500, 24 Oct. 1946 (FC, TEX); in a resaca pond south of Seventh street, Brownsville, *R. Runyon* 3891a, 28 Nov. 1944 (FC).

CALIFORNIA: floating in a pool of very salt water, Alameda, *W. J. V. Osterhout* & *N. L. Gardner*, 16 Sept. 1903 (Type of *Prasiola Gardneri* Coll. in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1185, NY; isotypes, FC [Fig. 141], TA); Richmond, *Gardner* 810, Sept. 1902 (TA); in a small spring near San Pablo, *Gardner*, 27 Sept. 1902 (as *Merismopoedia glauca* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1155, FC, L, TA); on sand wet by spring water, Lake Merced, San Francisco, *Gardner*, 15 Nov. 1905 (as *M. glauca* f. *mediterranea* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1651, FC, L, TA), *Gardner* 1578, Nov. 1905 (FC, S). BAHAMA ISLANDS: aquarium, Lerner Laboratory, Bimini, *H. J. Humm* 25a, 26 Mar. 1948 (FC). PUERTO RICO: in a pool about 4 km. north of Mayaguez, *N. Wille* 1310a, Feb. 1915 (Type of *M. Willei* Gardn.,

NY [Fig. 137]); with *Anacystis thermalis* (Menegh.) Dr. & Daily in a warm stream, Coamo Springs, Wille 384a, Jan. 1915 (NY). GUADELOUPE: shore, Vx. Bourg, A. Questel 255, 22 Feb. 1944 (FC, TA). BRAZIL: Estação Biológica do Alto da Serra, entre Santos e São Paulo, A. B. Joly 3, 4 May 1953 (D). NEW ZEALAND: Long Beach, Bay of Islands, M. A. Pocock & V. F. Lindauer, 1950 (D, FC). PHILIPPINES: mud at Dagat-Dagatan, Navotas, Rizal prov., G. T. Velasquez 441, 442, 12 Feb. 1940 (FC). NEW GUINEA: with *Najas flexilis* Delile in brackish lagoon, H. J. Rogers NG9, 20 Sept. 1944 (FC).

GENUS 5. MICROCROCIS

Richter in Hauck & Richter, Phyk. Univ. 11: 548. 1892. —Type species: *M. Dieteli* Richt.

Holopedium Lagerheim, Nuova Notarisia 4: 209. 1893. *Merismopoedia* Subgenus *Holopedium* Lagerheim, Öfvers. K. Sv. Vet.-Akad. Förh. 40(2): 43. 1883. *Holopedium* Subgenus *Microcrocis* Forti, Syll. Myxophyc., p. 111. 1907. —Type species: *Merismopoedia geminata* Lagerh.

Plantae microscopicae vel sub-macroscopicae, cellulis cylindraceis vel ovoideo-cylindraceis, in lamina irregulariter dispositis; divisione cellulae seriatim in duobus planis unoquodque ad alium et ad superficiem laminae perpendicularibus procedente; gelatino vaginale hyalino.

It is highly probable that plants of this genus are growth-forms of *Agmenellum thermale*, as indicated by Rabenhorst in Alg. Sachs. 71 & 72: 719 (1878): "Unter B finden sich Exemplare, wo die Gonidien nicht mehr der Gattung [*Merismopoedia*] entsprechend geordnet sind." Earlier, O. Bulnheim in Rabenh. Alg. Sachs. 51 & 52: 515 (1856) said: "Was als grösseres grünes Häutchen der *Merismopoedia* sich findet, hält Hr. A. Braun nicht für eine *Prasiola*, sondern für einen höhern Alterszustand bei *Merismopoedia*, in welchem die Theilung minder regelmässig geworden . . ." The few specimens available for study are inadequate to allow us to satisfy ourselves on this point.

One species:

MICROCROCIS GEMINATA Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, lb: 56. 1942. *Merismopoedia geminata* Lagerheim, Öfvers. K. Sv. Vet.-Akad. Förh. 40(2): 43. 1883. *Holopedium geminatum* Lagerheim, Nuova Notarisia 4: 209. 1893. —Paratype studied by the author, the type of *Microcrocis Dieteli* Richt. (L). See Lagerheim in Nuova Notarisia 1892: 207 and 1894: 655, and Richter, *ibid.* 1892: 292. The personal herbarium of G. Lagerheim is to be sought at the University of Quito. FIG. 181.

Microcrocis Dieteli Richter in Hauck & Richter, Phyk. Univ. 11: 548. 1892. *Holopedium Dieteli* Migula, Krypt.-Fl. Deutschl. 2(Alg. 1a): 41. 1905. —Type from Leipzig, Germany (L). FIG. 181.

Holopedium obvolutum Tiffany, Contrib. F. T. Stone Lab. Ohio State Univ. 6: 19. 1934. —Type from Put-in-Bay, Ohio (in the collection of L. H. Tiffany).

Original specimens have not been available to us for the following names: their original descriptions are here designated as the types until the specimens can be found:

Holopedium bellum Beck-Mannagetta, Arch. f. Protistenk. 66: 10. 1929. *Beckia bella* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 71. 1938.

Merismopoedia angularis Thompson, Univ. Kansas Sci. Bull. 25: 10. 1938.

Holopedium granulatum Skuja, Symbolae Bot. Upsal. 9(3): 41. 1948.

Plantae (laminae) aerugineae vel olivaceae, primum microscopicae deinde ad

1 mm. latae ambitu irregulares, cellulis post divisionem cylindraceis vel ovoideo-cylindraceis, ad apices rotundis, diametro 4—7 μ crassis, ad 15 μ longis, per gelatinum vaginale conferte distributis; gelatino vaginale hyalino, firmo vel diffuente; protoplasmate aerugineo vel olivaceo, homoganeo vel tenui-granuloso. FIG. 181.

In long-standing shallow pools, in old cultures, and seldom in the plankton.

Specimens examined:

GERMANY: Leipzig, in einem Wassergraben, *P. Dietel*, Apr. 1891 (Type of *Microcrocis Dieteli* Richt. in Hauck & Richt., Phyk. Univ. no. 548, L; isotypes, FH, MIN, N [Fig. 181]; paratypes of *Merismopoeidia geminata* Lagerh.); Leipzig in dem grossen Lautzschens Teiche, *O. Bulnheim*, Mar. 1856 (with *M. elegans* in Rabenh. Alg. no. 515, FC, FH, L, NY, UC); auf Ebschlamm kultivirt, *Reinicke* (with *M. convoluta* var. *aeruginosa* in Rabenh. Alg. no. 719, FC, L). FRANCE: Calvados? ex herb. Lebel (FC). OHIO: Terwilliger's pond, Put-in-Bay, *E. H. Ahlstrom*, Aug. 1932 (Type of *Holopedium obovatum* Tiff. in the private collection of L. H. Tiffany).

GENUS 6. GOMPHOSPHAERIA

Kützling, Alg. Aq. Dulc. Germ. Dec. 16: 151. 1836. *Gomphosphaeria* Subgenus *Eugomphosphaeria* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 67. 1923. —Type species: *Gomphosphaeria aponina* Kütz.

Original specimens of the type species for the following names have not been available to us for study:

Coelocystis Nägeli in Kützling, Sp. Algar., p. 209. 1849. *Coelosphaerium* Nägeli, Gatt. Einzell. Alg., p. 54. 1849. *Gomphosphaeria* Subgenus *Coelosphaerium* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 67. 1923. —Type species: *Coelocystis Kuetzingianum* Näg. (= *Coelosphaerium Kuetzingianum* Näg.)

Thamniastrum Reinsch, Notarisia 3: 513. 1888. —Type species: *T. cruciatum* Reinsch.

Marssoniella Lemmermann, Ber. Deutsch. Bot. Ges. 18: 275. 1900. —Type species: *M. elegans* Lemm.

Woronichinia Elenkin, Acta Inst. Bot. Acad. Sci. U. R. P. S. S., ser. II, 1: 28. 1933. —Type species: *Coelosphaerium Naegelianum* Ung.

Snowella Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 278. 1938. —Type species: *Coelosphaerium roseum* Snow.

Plantae microscopicae, multicellulares, sphaericae vel ovoideae, varie tuberculosae et in divisione constrictae, cellulis sphaericis, ovoideis, cylindraceis, obovoideis, vel pyriformibus, radiatim in superficie thalli irregulariter aut in seriebus aliis ad alias perpendicularibus dispositis; divisione cellulae seriatim in duobus planis unoquodque ad alium et ad superficiem thalli perpendicularibus procedente; gelatino vaginale hyalino, homoganeo vel circum cellulas laminoso, saepe conspicua filiola dichotome ramosa a cellulis ad centrum thalli exhibente.

Plants of *Gomphosphaeria* are typically sphaerical, with the cells arranged radially in a single layer in the periphery of the gelatinous matrix. Cell division proceeds successively in two planes perpendicular to each other and radial within the plant. Individual sheaths are evident about the cells in many plants of *G. aponina* and *G. lacustris*; the remains of the old parts of these sheaths form a dichotomously branched structure extending radially toward the center of the gelatinous matrix. In some plants, the rest of the gelatinous matrix hydrolyzes, and the dichotomous structure remains intact.

Key to species of *Gomphosphaeria*:

Cells before division 3—5 μ in diameter, containing pseudovacuoles; plants developing as water blooms in fresh water 1. *G. WICHURAE*

Cells before division 2—4 μ in diameter, without pseudovacuoles; plants not developing as water blooms 2. *G. LACISTRIS*

Cells before division 4—15 μ in diameter, without pseudovacuoles; plants not developing as water blooms 3. *G. APONINA*

1. *GOMPHOSPHAERIA WICHURAE* Drouet & Daily, Butler Univ. Bot. Stud. 10: 222. 1952. *Coelosphaerium Wichurae* Hilse in Rabenhorst, Alg. Eur. 153—156: 1523. 1863; Hedwigia 1863: 151. 1863. —Type from Reichenbach, Silesia (FC). FIG. 173.

Hydroepicoccum genuense de Notaris, Erb. Critt. Ital., ser. 2, 4: 178. 1869; Hedwigia 1869: 86. 1869. *Coelosphaerium genuense* Ardissoni & Strafforello, Enum. Alg. Liguria, p. 61. 1877. —Isotypes from Genoa, Italy (FC, FH, L, NY, UC). FIG. 174.

Coelosphaerium Naegelianum var. *Lemmermannii* Elenkin & Hollerbach, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 156. 1923. *Woronichinia Naegeliana* var. *Lemmermannii* Elenkin & Hollerbach, Acta Inst. Bot. Acad. Sci. U. R. P. S. S., ser. 2, Pl. Crypt. 1: 32. 1933. *W. Naegeliana* f. *Lemmermannii* Elenkin in Elenkin & Hollerbach, loc. cit. 1933. —Specimens from Oswitz near Breslau, Silesia, designated as isotypes (L, S, TA).

Gomphosphaeria fusca Skuja, Symbolae Bot. Upsal. 9(3): 39. 1948. —Topotype from Erken, Uppland, Sweden, received from the author (D). FIG. 177.

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Gomphosphaeria lilacea Virieux, Ann. Biol. Lac. 8: 69. 1916.

Microcystis elabens var. *major* Bachmann, Mitt. Naturf. Ges. Luzern 8: 11. 1921.

Synechococcus endobioticus Elenkin & Hollerbach, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 160. 1923. *Synechocystis endobiotica* Elenkin & Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 23. 1938.

Plantae smaragdinae vel laete aerugineae, sphaericae vel ovoideae varie tuberculosae et constrictae, cellulis ovoideis vel ovoideo-cylindraceis, diametro ante divisionem 3—5 μ crassis, in superficie thalli dense et irregulariter vel in seriebus aliis ad alias perpendicularibus ordinatis; gelatino vaginale hyalino, firmo vel (interdum omnino) diffuente, homoganeo vel filiola dichotoma ad centrum thalli inconspicue exhibente; protoplasmate aeruginoso, pseudovacuolis farcto. FIGS. 173, 174, 177.

In the plankton of bodies of fresh water; often found as conspicuous and heavy water blooms during the warmer months of the year. In heavy water blooms, the cells of many plants of *Gomphosphaeria Wichurae* dissociate as the gelatinous matrix hydrolyzes. The firmer matrices of other plants may harbor bacteria, *Phormidium mucicola* Naum. & Hub., and other organisms. Gomphosphaerioid growth-forms of *Lamprocystis rosea* (Kütz.) Dr. & Daily, the cells of which contain a red pigment, are sometimes confused with plants of *Gomphosphaeria Wichurae*. Also a growth-form of *Anacystis cyanea* in which most of the cells are distributed in the periphery of the gelatinous matrix may simulate plants of this species.

Specimens examined:

SWEDEN: Järlasjön, Stockholm, *G. Lagerheim*, Sept. 1898 (S); Frisksjön, Loftahammar, Smolandia, *O. Borge*, Jun. 1914 (S); in rivulo, Ljusterö, Stockholm, *K. Bohlin*, Aug. 1896 (S); Valloxen, Uplandia, *Borge*, Oct. 1897 (S); Erken, Uppland, *H. Skuja*, 1 Oct. 1950 (topotype of *Gomphosphaeria fusca* Skuja, FC [Fig. 177]); lacus ad Tenhult Smolandiae, *O. Nordstedt*, 13 Aug. 1900 (NY, S), 18 Jun. (as *Coelosphaerium Naegelianum* in Mus. Vindob. Krypt. Exs. no. 1631, FC, L, NY, S); Sövedsjön, Malmöhus, *B. Carlin-Nilsson* 520, 17 Aug. 1937 (D). POLAND: Silesia: auf einem Teiche am Schlosse von Habendorf, Kr. Reichenbach, *Hilse*, Sept. 1862 (Type of *C. Wichurae* Hilse in Rabenh. Alg. no. 1523, FC [Fig. 173]; isotypes, L, NY, UC); in einem

Wasserloche hinter Oswitz bei Breslau, *O. Kirchner*, Aug. 1874 (designated as isotypes of *C. Naegelianum* var. *Lemmermannii* Elenk. & Hollerb. in Rabenh. Alg. no. 2423, L, S, TA). GERMANY: Boxheim im Plankton, *Lauterborn*, Aug. 1902 (as *C. Naegelianum* in Mig., Krypt. Germ., Austr., & Helv. Exs., Alg. no. 14, NY); Leipzig, Bernbruch bei Grimma, *P. Richter* (NY); auf einem Teiche in Bernbruch bei Lausigk, *Richter*, Jul. 1864 (as *C. Kuetzingianum* in Rabenh. Alg. no. 1791, NY), Jul. 1874 (TA); Lausigk, *Richter* (N); Dumsweiher bei Kosback bei Erlangen, *H. Glück*, 9 Sept. 1865 (as *C. Kuetzingianum* in Hauck & Richt., Phyk. Univ. no. 683, L, NY, S). CZECHOSLOVAKIA: Bohemia: Jordan u Tábor, *A. Hansgirk*, Aug. 1883 (FC, W); piscina Radov prope Blatná, *B. Fott*, 20 Sept. 1948 (FC); great pond of Doksy, *B. Fott*, 15 Sept. 1948 (FC). ITALY: in aquariis horti botanici Genuensis, *de Notaris*, 1868—69 (isotypes of *Hydroepicoccum genuense* de Not. in Rabenh. Alg. no. 2127, FC [Fig. 174], FH, L, NY, UC; Erb. Critt. Ital., ser. 2, no. 178, FH); in una vasca dell'Orto botanico di Pisa, *A. Mori & A. Lodi*, Aug. 1882 (as *Coelosphaerium Kuetzingianum* in Erb. Critt. Ital., ser. 2, no. 1252, FC, UC). SCOTLAND: Loch Chalium near Loch Shurrery, *Caithness*, *A. J. Brook* 4, 4 Jul. 1950 (D). MASSACHUSETTS: Spot pond, Medford, *F. S. Collins*, 2 Oct. 1881 (NY); Hammond pond, Brookline, *B. M. Davis*, 20 Oct. 1893 (D, MICH, MO, YU); Fresh pond, Cambridge, *W. G. Farlow*, Oct. 1886 (MO); South Framingham, *Farlow*, Oct. 1879 (MO); Framingham, *A. K. Stone* (N); ad Framingham, *Farlow*, 1883 (as *C. Kuetzingianum* in Witt. & Nordst., Alg. Exs. no. 692, FC, L, NY, S); on Winchester reservoir, Winchester, *Collins*, 2 Oct. 1898 (as *C. Kuetzingianum* in Coll. Hold. & Setch., Phyc. Bor.-Amer. no. 553, FC, D, L, MICH, NY, TA), *Collins* 3554, 14 Aug. 1899 (NY), Aug. 1899 (as *C. Kuetzingianum* in Coll., N. Amer. Alg. no. 2, D, NY); Arlington, *E. Dewart* 2160, 27 Jul. 1891 (FC, D, L, NY, S, TA). CONNECTICUT: water-bloom, Housatonic river, *H. C. Bold* B-3, 30 Sept. 1939 (DA, FC); in Avery's brook, Ledyard, *W. A. Setchell* 549, Sept. 1892 (UC). NEW YORK: Basic reservoir, Rensselaerville, *M. S. Markle* 25, Jul. 1947 (EAR, FC); plankton of Lake Mohansic, Westchester county, *Bold* B121, 4 Oct. 1941 (FC).

NEW JERSEY: bloom on protected bay, Lake Farrington, New Brunswick, *E. T. Moul* 6108, 19 Sept. 1948 (FC). PENNSYLVANIA: Mercer county: Shenango river, New Hamburg, *L. Walp & W. Murchie* 1, 26 Jun. 1941 (FC), Greenville, Sharon, and Wheatland, *Walp & Murchie* 3—5, 6 Jul. 1941 (FC). ONTARIO: Experiment farm, Ottawa, *J. Fletcher*, Aug. 1888 (FH). OHIO: south reservoir, Portage Lake near Akron, *E. H. Ahlstrom*, 28 Dec. 1932 (DA, FC); Chippewa lake, *Ahlstrom*, 30 Aug. 1931 (DA, FC); Lake Erie, *L. H. Tiffany*, 1929 (DA, FC); Decker lake near Piqua, Miami county, *C. F. Clark*, 23 Oct. 1942 (DA, FC); plankton in Arlington cemetery lake, Cincinnati, *W. A. Daily & J. H. Hoskins* 108, 4 Oct. 1939 (DA, FC); in State Hospital pond, Athens, *A. H. Blicke*, 8 Oct. 1941 (DA, FC). MICHIGAN: Benton Harbor, *M. E. Britton*, Aug. 1939 (DA, FC); Sodon lake west of Bloomfield Hills, Oakland county, *S. A. Cain*, 9 Dec. 1947 (FC); in Marble lake near Quincy, *G. W. Prescott* M411a, 21 Sept. 1937 (FC); "Three Lakes", Ann Arbor, *L. N. Johnson* 5, 27 Sept. 1892 (FC). INDIANA: Anderson's pond 3 miles south of Hartsville, Bartholomew county, *F. K. & W. A. Daily* 1040, 11 Oct. 1942 (DA, FC); Jimmy Strahl lake, Brown County state park, *R. E. A. & M. Friische* 1—3, 2 Nov. 1947 (DA, FC); Lake Cicott, Cass county, *F. K. & W. A. Daily* 1023, 9 Sept. 1942 (DA, FC); Lake McCoy, 3—5 miles east of Greensburg, Decatur county, *F. K. & W. A. Daily* 1038, 1182, 11 Oct. 1942, 19 Sept. 1943 (DA, FC); Cups pond, 4 miles east of Greensburg, *F. K. & W. A. Daily* 1039, 11 Oct. 1942 (DA, FC); southeast shore of Heaton lake, 6 miles northeast of Elkhart, *F. K. & W. A. Daily* 2619, 2621, 26 Aug. 1952 (DA, FC); South Mud lake, 4 miles east of Fulton, *F. K. & W. A. Daily* 1482, 29 Jun. 1946 (DA, FC); in quarry on Washington street, Kokomo, *F. K. & W. A. Daily* 1026, 10 Sept. 1942 (DA, FC); west side of Dewart lake, Kosciusko county, *F. K. & W. A. Daily* 2115a, 9 Jul. 1949 (DA, FC); Center lake, Warsaw, *F. K. & W. A. Daily* 2180, 22 Jul. 1950 (DA, FC); Durham (Daniel) lake, Kosciusko county, *F. K. & W. A. Daily* 2262, 26 Jul. 1950 (DA, FC); Lake Wawasee, Syracuse, *F. K. & W. A. Daily* 221, 2238, 2245, 24—26 Jul. 1950 (DA, FC); Carr's lake northeast of Claypool, Kosciusko county, *F. K. & W. A. Daily* 2174, 22 Jul. 1950 (DA, FC); Tippecanoe lake near North Webster, *H. B. Metcalf* 2, 12 Oct. 1947 (DA, FC), *F. K. & W. A. Daily* 2228, 2229, 25 Jul. 1950 (DA, FC); Little Tippecanoe (James) lake, Kosciusko county, *F. K. & W. A. Daily* 2227, 25 Jul. 1950 (DA, FC); Wabec lake southeast of Milford, *F. K. & W. A. Daily* 2636, 28 Aug. 1952 (DA, FC); Webster lake at North Webster, *F. K. & W. A. Daily* 2222, 2226, 25 Jun. 1950 (DA, FC); Syracuse lake at city park, Syracuse, *F. K. & W. A. Daily* 2195, 23 Jul. 1950 (DA, FC); Atwood lake west of Wolcottville, Lagrange county, *F. K. & W. A. Daily* 2687, 26 Aug. 1953 (DA, FC); Indian lake near Fort Benjamin Harrison, Marion county, *F. K. & W. A. Daily* 1050, 1051, 18 Oct. 1942 (DA, FC); Lake Maxinkuckee, Marshall county, *G. T. Moore*, 28 Aug. 1899 (FC), *F. K. & W. A. Daily* 1533, 1542, 4-5 Jul. 1946 (DA, FC); small lake at north edge of Rome City, *F. K. & W. A. Daily* 2278, 29 Jul. 1950 (DA, FC); outlet of Sylvan lake, Rome City, *F. K. & W. A. Daily* 2277, 29 Jul. 1950 (DA, FC); Cree lake, 4 miles north of Kendallville, Noble county, *F. K. & W. A. Daily* 1914, 12 Sept. 1947 (DA, FC); Skinner lake, east of Albion, Noble county, *F. K. & W. A. Daily* 1912, 12 Sept. 1947 (DA, FC); Thomas lake east of Lena, Parke county, *F. K. & W. A. Daily* 2531, 25 Aug. 1951 (DA, FC); Eliza lake, Moss lake, and Spectacle lake near Valparaiso, Porter county, *F. K. & W. A. Daily* 2567, 2574, 2576, 30 Aug. 1951 (DA, FC); Bass lake, 6 miles west of Angola, *F. K. & W. A.*

Daily 1917, 12 Sept. 1947 (DA, FC); Hamilton lake, Hamilton, Steuben county, F. K. & W. A. Daily 2444, 2449, 17 Jun. 1951 (DA, FC); Hogback lake, Steuben county, C. M. Palmer 1015, Jul. 1933 (DA, FC); Lake James, Pokagon state park, Steuben county, F. K. & W. A. Daily & I. Spangler 1931, 13 Sept. 1947 (DA, FC); Lake Lonidaw, Pokagon state park, S. A. Joyner, 31 Aug. 1949 (DA, FC); Otter lake, Steuben county, 13 Sept. 1947 (DA, FC); Pleasant lake, Steuben county, F. K. & W. A. Daily 2458, 18 Jun. 1951 (DA, FC); Snow lake, 7 miles north of Angola, F. K. & W. A. Daily 1943, 1945, 13—14 Sept. 1947 (DA, FC); Shakamak lake, Shakamak state park, Sullivan county, Palmer B18, 8 Sept. 1933 (DA, FC), F. K. & W. A. Daily, F. Geissler, & F. Hueber 2378, 23 Sept. 1950 (DA, FC); pond at Rose Polytechnic Institute, Terre Haute, B. H. Smith 134, 30 Jul. 1929 (DA, FC); pond on state road no. 9 near Columbia City, Whitley county, F. K. & W. A. Daily, 14 Sept. 1947 (DA, FC).

WISCONSIN: Lake Mendota, Madison, W. Trelease, Oct. 1886 (D, FH), R. E. Blount, 2 Oct. 1886 (FC); small lake near Clear lake, Rock county, J. B. Lackey, Aug. 1943 (FC); Hog creek, Chippewa flowage, Sawyer county, G. W. Prescott 3W185, 30 Aug. 1938 (FC); Little Star lake, Prescott 3W95, 21 Aug. 1938 (FC). ILLINOIS: Cook county, M. E. Britton 987, 8 Sept. 1939 (DA, FC); Maple lake, Cook county, Britton 993, 8 Sept. 1939 (DA, FC); Lake Zurich, Fish lake, Petit lake, and Lake Marie, Lake county, Britton 916, 940, 956, 959, 1030, 1032, 1051, Aug.—Sept. 1939 (DA, FC); Channel lake 3 miles west of Antioch, Lake county, Britton 1038, 1043, 14 Sept. 1939 (DA, FC). MINNESOTA: Cass lake, Cass county, C. B. Reif, 11 Sept. 1936 (DA, FC); Lake Itasca, Clearwater county, S. Eddy, 20 Aug. 1905 (DA, FC); Lake of the Isles, Minneapolis, F. Drouet 5593, 19 Aug. 1944 (FC); Cross lake, just north of Minneapolis, C. B. Reif, 22 Sept. 1936 (DA, FC); Lake Minnetonka at Spring Park, Hennepin county, Drouet, A. A. Cohen, & E. Cohen 5007, 5016, 8 Aug. 1943 (FC); Waterville, Le Sueur county, J. C. Arbur (FH); Little Pelican and Sear lakes, Ottertail county, S. Eddy, Jul.—Aug. 1940 (DA, FC); Keller lake north of St. Paul, Drouet & E. Cohen 5045, 5050, 9 Aug. 1943 (FC); Lake Gervais and Lake Owasso, Ramsey county, S. Eddy, 25 Jun., 15 Aug. 1931 (DA, FC); Poplar lake, Superior national forest, C. B. Reif, 28 Jun. 1935 (DA, FC); Osakis lake, Todd county, Reif, 19 Jul. 1938 (DA, FC); Long lake northeast of North St. Paul, in Washington county, Drouet & E. Cohen 5062, 9 Aug. 1943 (FC). MISSOURI: St. Charles, B. Ennis, 12 Nov. 1930 (D); Reed's lake, Callaway county, J. R. Hurt R-1, R-8, 14 Oct. 1939, 12 Jun. 1940 (FC); New and Old Fayette lakes near Fayette, Howard county, Hurt NF-2, OF-1, NF-11a, 24 Nov. 1939, 4 Jun. 1940 (FC). NEBRASKA: sandpit pond north of David City, Butler county, W. Kiener 21570a, 8 Nov. 1946 (FC, KI); sandpit lakes, Fremont, Dodge county, Kiener 19700, 23934, 1 Jul. 1948, 15 Sept. 1945 (FC, KI); lake 3 miles east of Stratton, Hitchcock county, Kiener 10470, 24 Jul. 1941 (FC, KI); pond in city park, Norfolk, Madison county, Kiener 22916, 15 Oct. 1947 (FC, KI). BRITISH COLUMBIA: Deer lake near Burnaby Lake, New Westminster county, J. E. Nielsen 81, 91, 14 Jun. 1924, 22 Nov. 1925 (FC). WASHINGTON: Phantom Lake, W. T. Edmondson, 30 Jun. 1953 (FC); Fidalgo island, L. E. Griffin, summer 1938 (FC). CALIFORNIA: Big Bear lake, San Bernardino county, G. J. Hollenberg 469, 1624, 26 Aug. 1934 (FC, D, UC).

2. *GOMPHOSPHAERIA LACUSTRIS* Chodat, Bull. Herb. Boiss. 6: 180. 1898. *Coelosphaerium lacustre* Ostenfeld, Hedwigia 46: 396. 1907. —Topotypic material from Lac de Joux, Switzerland (in the collection of Otto Jaag).

Chroococcus minutus var. *minimus* Keissler, Verh. K. K. Zool.-bot. Ges. Wien 51: 394. 1901. *C. minimus* Lemmermann, Ark. f. Bot. 2(2): 102. 1904. *Gloeocapsa minima* Hollerbach in Elenkin, Monogr. Algae. Cyanophyc., Pars Spec., 1: 242. 1938. —Type from Attersee, Upper Austria (W).

Gomphosphaeria lacustris var. *compacta* Lemmermann, Abh. Nat. Ver. Bremen 16: 341. 1899. *G. compacta* Ström, Naturw. Unters. Sarekgebirges in Schwed.-Lappl. 3(Bot., Lief. 5): 446. 1923. —Material named by the author from Lake Wombsjön, Sweden, designated as the Type (S).

Coelosphaerium Collinsii Drouet & Daily in Daily, Amer. Midl. Nat. 27: 653. 1942. —Type from Naushon island, Massachusetts (D). FIG. 176.

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Coelocystis Kuetzingiana Nägeli in Kützing, Sp. Algar., p. 209. 1849. *Coelosphaerium Kuetzingianum* Nägeli, Gatt. Einzell. Alg., p. 54. 1849. —Thorough search through the F. T. Kützing herbarium at Leiden and the Nägeli herbaria at Zürich and Munich has failed to discover that the original specimens were preserved. Nägeli's sketches and notes, from the notebooks in the Pflanzenphysiologisches Institut, Eidgenössische Technische Hochschule, Zürich, are reproduced here: FIG. 175.

Coelosphaerium Naegelianum Unger, Denkschr. K. Akad. Wiss. Wien, Math.-Nat. Kl., 7: 195. 1854. *Gomphosphaeria Naegeliana* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 80. 1907.

Woronichinia Naegeliania Elenkin, Acta Inst. Bot. Acad. Sci. U. R. P. S. S., ser. 2, Pl. Crypt. 1: 28. 1933.

Thamniastrum cruciatum Reinsch, Notarisia 3: 513. 1888. —See Taft in Bull. Torr. Bot. Club 72: 246. 1945.

Coelosphaerium aerugineum Lemmermann, Bot. Centralbl. 76: 154. 1898. *C. anomalum* var. *aerugineum* Hansgirg, Beih. z. Bot. Centralbl. 8(2): 516. 1905.

Marsoniella elegans Lemmermann, Ber. Deutsch. Bot. Ges. 18: 275. 1900.

Coelosphaerium roseum Snow, Bull. U. S. Fish Comm. 1902: 387, 390. 1903. *Gomphosphaeria rosea* Lemmermann, Krypt.-Fl. Mark Brandenburg. 3: 80. 1907. *Snowella rosea* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 278. 1938.

Gomphosphaeria litoralis Håyrén, Bidrag t. Kännedom Finlands Nat. och Folk 20(3): 91. 1921.

Coelosphaerium radiatum G. M. Smith, Roosevelt Wild Life Bull. 2: 136. 1924.

Coelosphaerium pusillum Van Goor, Rec. Trav. Bot. Neerl. 21: 318. 1924.

Coelosphaerium Geisleri Schiller, Sitzungsber. Oesterr. Akad. Wiss., Math.-Nat. Kl., I, 163: 131. 1954.

Plantae aerugineae, olivaceae, violaceae, vel roseae, sphaericae vel ovoideae varie tuberculosae vel constrictae, cellulis globosis vel ovoideis, etiam obovoideis, diametro ante divisionem 2—4 μ crassis, in superficie thalli irregulariter aut in seriebus aliis ad alias perpendicularibus ordinatis; gelatino vaginale hyalino, firmo vel (interdum omnino) diffuente, homoganeo vel filiola dichotoma ad centrum thalli vulgo exhibente; protoplasmate aerugineo, olivaceo, vel roseo, homoganeo. FIGS. 175, 176.

In the plankton of lakes, ponds, and rivers, and in shallow water and pools along their margins. Plants of *Gomphosphaeria lacustris* developing in shallow water are usually firmer and more compact than those in the plankton, and their cells are often more ovoid or obovoid than are those of the latter. Growth-forms of the bacterial *Lamprocystis rosea* (Kütz.) Dr. and Daily, especially those in which the pseudovacuoles have been lost, are often confused with this species. Likewise, certain growth-forms of *Anacystis montana* may superficially resemble this species.

Specimens examined:

SWEDEN: Saxorp, Vestergötland, O. Nordstedt, Jun. 1883 (S); in lacu Wombsjön Scaniae, Nordstedt, Jun. 1901 (designated as Type of *Gomphosphaeria lacustris* var. *compacta* Lemm., S). AUSTRIA: Attersee, Upper Austria, C. von Keissler, 13 Aug. 1900 (Type of *Chroococcus minutus* var. *minimus* Keissl. in the slide collection of C. Keissler, W). SWITZERLAND: Lac de Joux, Vaud, O. Jaag (topotype of *Gomphosphaeria lacustris* in the collection of O. Jaag). IRELAND: Lough Corrib, G. S. West 53 (FC, UC). NEW BRUNSWICK: pool, lower basin, Grand Falls, Victoria county, H. Habeeb 10849, 30 Sept. 1948 (FC, HA). MAINE: Long Pond, Mt. Desert island, F. S. Collins 3964, July 1900 (NY, UC). MASSACHUSETTS: French Watering Place, Naushon island, F. Drouet 2125, 12 Aug. 1937 (Type of *Coelosphaerium Collinsii* Dr. & Daily, D [Fig. 176]); Fresh pond, Nobska point, Falmouth, Drouet 1948, 16 Sept. 1936 (D). QUEBEC: étang envahi par les grandes marais, Baie Kopaluk (estuaire de rivière George), Ungava, J. Rousseau 1099a, 10 Aug. 1947 (FC). NORTH CAROLINA: Mullet pond, Shackleford Banks, Beaufort, H. J. Humm & C. S. Nielsen 1792, 23 Aug. 1949 (FC, T). FLORIDA: Leesburg, M. A. Brannon 332, 31 May 1948 (FC, PC); on Chara, Battery Point, Hernando county, Brannon 554, 23 Oct. 1948 (FC, PC). OHIO: Terwilliger's pond, South Bass island, Ottawa county, E. H. Ahlstrom, 4 Sept. 1931 (DA, FC); ponds, Newtown fish hatchery, Hamilton county, J. B. Lackey, Jul. 1944 (FC). MICHIGAN: Lake La Grange northeast of Dowagiac, Cass county, L. P. Woods, L. L. Pray, & F. H. Leil, Aug. 1942 (FC); Interlochen, Grand Traverse county, J. H. Hoskins, 29 Aug. 1934 (DA, FC).

INDIANA: Elkhart county: Heaton lake 6 miles northeast of Elkhart, F. K. & W. A. Daily 2621, 26 Aug. 1952 (DA, FC). Jackson county: sluiceway of dam, Driftwood state fish hatchery 2 miles south of Vallonia, F. K. & W. A. Daily 2343, 26 Aug. 1950 (DA, FC). Kosciusko county: Dewart lake, F. K. & W. A. Daily 2119, 9 Jul. 1949 (DA, FC); Laka Wawasee, F. K. & W. A. Daily 2183, 2203, 2207, 2214, 2238, 2250, 2272, 23—26 Jul. 1950 (DA, FC); Wabec lake south-east of Milford, F. K. & W. A. Daily 2636, 28 Aug. 1952 (DA, FC). Marion county: Geist reservoir 8 miles northeast of Indianapolis, F. K. & W. A. Daily 2485, 16 Sept. 1951 (DA, FC). Porter county: Flint lake 3 miles north of Valparaiso, F. K. & W. A. Daily 2569, 30 Aug. 1951 (DA,

FC). Starke county: pond, Bass Lake state fish hatchery 5 miles south of Knox, *E. Warkentien & F. K. & W. A. Daily* 1553, 6 Jul. 1946 (DA, FC). Steuben county: Bass lake 6 miles west of Angola, *F. K. & W. A. Daily* 1917A, 12 Sept. 1947 (DA, FC); Clear lake 6 miles east of Fremont, *F. K. & W. A. Daily* 2452, 17 Jun. 1951 (DA, FC); Crooked lake, *C. M. Palmer B49b*, Sept. 1933 (DA, FC); Fox lake, *Palmer* 1019, Jul. 1933 (DA, FC); Gentian lake 6 miles north of Angola, *F. K. & W. A. Daily* 2659, 2666, 2671, 2674, 24 Aug. 1953 (DA, FC); Hamilton lake, Hamilton, *F. K. & W. A. Daily* 2449, 17 Jun. 1951 (DA, FC); Lake James, Pokagon state park, *S. A. Joyner*, 6 Jul. 1949 (DA, FC), *F. K. & W. A. Daily* 2474, 2677, 19 Jun. 1951, 25 Aug. 1953 (DA, FC); Jimerson lake 7 miles northwest of Angola, *F. K. & W. A. Daily* 2479A, 18 Jun. 1951 (DA, FC).

WISCONSIN: Pell lake near Lake Geneva, Walworth county, *W. E. Lake*, Aug. 1942 (FC); Round lake and Connors lake, *G. W. Prescott* 3W181, 3W213 (DA, FC); small lake near Clear lake, Rock county, *J. B. Lackey*, Aug. 1945 (FC). MINNESOTA: Lida lake, Ottertail county, *S. Eddy*, 5 Aug. 1940 (DA, FC); Lake Itasca, Clearwater county, *Eddy*, 18 Aug. 1933 (DA, FC), *F. O. Fortsch* 18, 22, 1 Jul. 1954 (D). NEBRASKA: Jackson lake 9 miles north of North Platte, Lincoln county, *W. Kiener* 17516, 1 Sept. 1944 (FC, KI). SASKATCHEWAN: Last Mountain lake, Humboldt county, *P. E. Kuebne*, 7 Sept. 1940 (FC). MONTANA: Middle Quartz lake, Glacier national park, *Long* F175, 1 Sept. 1934 (FC). WYOMING: Fayette lake, Fremont county, *Bond* F268, 23 Aug. 1934 (FC). NEW MEXICO: pond in the lava-beds 6—8 miles east of Grant, Valencia county, *A. A. Lindsey* 8, 12 Aug. 1944 (FC). UTAH: Steam Mill and Tony Grove lakes, Cache county, *G. Piranian*, 13—14 Aug. 1933 (FC).

3. *GOMPHOSPHAERIA APONINA* Kützing, Alg. Aq. Dulc. Dec. 16: 151. 1836. *Sphaerastrum cuneatum* Kützing in Meneghini, Consp. Algol. Eugén., p. 337. 1837. —Type from Abano, Italy (L). FIG. 179.

Gomphosphaeria aponina var. *cordiformis* Wolle, Bull. Torr. Bot. Club 9: 25. 1882. *G. cordiformis* Hansgirg, Oesterr. Bot. Zeitschr. 36: 333. 1886. *G. aponina* b. *cordiformis* Wolle ex Hansg., Prodr. Algenfl. Böhmen 2: 144. 1892. *G. aponina* f. *cordiformis* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 286. 1938. —Type from Bethlehem, Pennsylvania (FC). FIG. 178.

Gomphosphaeria cordiformis var. *olivacea* Hansgirg, Oesterr. Bot. Zeitschr. 36: 333. 1886. *G. aponina* var. *olivacea* Hansgirg, Prodr. Algenfl. Böhmen 2: 144. 1892. *G. aponina* f. *olivacea* Forti, Syll. Myxophyc., p. 98. 1907. —Type from Ouzic, Bohemia (W). FIG. 180.

Gomphosphaeria aponina var. *multiplex* Nygaard, Vidensk. Medd. Dansk Naturh. Foren. Kjöbenhavn. 82: 204. 1926. *G. aponina* f. *multiplex* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 286. 1938. —Type from Kai islands, Indonesia (in the collection of G. Nygaard).

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Gomphosphaeria aponina var. *limnetica* Virieux, Ann. Biol. Lac. 8: 68. 1916. *G. aponina* f. *limnetica* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 286. 1938.

Gomphosphaeria aponina var. *delicatula* Virieux, Ann. Biol. Lac. 8: 69. 1916. *G. aponina* f. *delicatula* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 286. 1938.

Gomphosphaeria aponina f. *major* Pevalek, Geobot. & Algol. Istraz. Cretova u Hrvatskoj & Sloven. Rad 230: 86. 1924.

Gomphosphaeria aponina var. *gelatinosa* Prescott, Hydrobiologia 2(1): 93. 1950.

Plantae aerugineae, olivaceae, luteolae, violaceae, vel roseae, sphaericae vel ovoideae aetate protracta varie constrictae, cellulis ovoideis, cylindraceis, obovoideis, vel pyriformibus, in divisione saepe cordiformibus, diametro ante divisionem 4—15 μ crassis, in superficie thalli irregulariter vel in seriebus aliis ad alias perpendicularibus ordinatis; gelatino vaginale hyalino, vulgo firmo nonnumquam (etiam omnino) diffuentes, homoganeo vel lamellosa, filiola dichotoma ad centrum thalli plerumque exhibente; protoplasmate aerugineo, olivaceo, luteolo, violaceo, vel roseo, homoganeo vel tenui-granuloso. FIGS. 178—180.

In shallow fresh, brackish, and marine waters, in seepage, and in the plankton. Under certain conditions, the protoplasts shrink and evidently secrete additional material within their individual sheaths; later they may continue growth again as a strain with narrower cells. Where the plants of *Gomphosphaeria aponina* dis-

integrate, groups of cells sometimes remotely resemble those of *Anacystis thermalis*.

Specimens examined:

POLAND: Mergelsgruben bei Warkotsch bei Strehlen in Schlesien, Bleisch (as *Gomphosphaeria aponina* in Rabenh. Alg. no. 1497, FC, UC). GERMANY: Leipzig, um Altmanndorf, P. Richter (L, UC); Pötschau bei Leipzig, Auerswald, Aug. 1959 (UC); in einem Graben am Eisenbahndamme oberhalb Beiersdorf in Franken, P. Reinsch, 9 Oct. 1864 (as *G. aponina* in Rabenh. Alg. no. 1911, FC, L, UC). CZECHOSLOVAKIA: in seichtem Wasser und in Schlamm am Rande der Salzwassersümpfe bei Ouzie nächst Kralup in Böhmen, A. Hansgig, Apr. 1884 (Type of *G. cordiformis* var. *olivacea* Hansg., W; isotype, FC [Fig. 180]; isotypes in Fl. Exs. Austro-Hung. no. 3600, L, MO, S, W). JUGOSLAVIA: Salona prope Spalato, Hansgig, Aug. 1889 (FC, W). ITALY: Abano, F. T. Kützing (DT, FC, L, MO, UC), May 1835, inter *Confernam aponinam* (Type of *Gomphosphaeria aponina* Kütz., L [Fig. 179]; isotypes in Kütz., Alg. Aq. Dulc. Dec. no. 151, L, UC); in thermis Euganeis, G. Meneghini (L, S); Monfalcone, in aqua subsalsa, Hansgig, Aug. 1889 (FC, W). TRIESTE: in aqua subsalsa, Capo d'Istria, Hansgig, Aug. 1889 (FC, W). SCOTLAND: Loch Shurrery, Caithness, A. J. Brook 2, 3 Aug. 1950 (D). BERMUDA: Lovers lake (brackish), western St. Georges island, A. J. Bernatowicz 49-111, 1 Mar. 1949 (FC, MICH). NEW BRUNSWICK: in a pond, St. Anne, Madawaska county, H. Habeeb 11617, 11620, 22 Aug. 1950 (FC, HA). MASSACHUSETTS: in Gardiner's ditch, Woods Hole, F. Drouet 1908, 10 Aug. 1936 (D, FH, NY); in tide-pools of harbor, Curyhunk island, Gosnold, Drouet 2122, 3 Aug. 1937 (D, DT, FH). CONNECTICUT: basin, Norwich, W. A. Setchell, Jul. 1888 (UC). PENNSYLVANIA: in stagnis ad Bethlehem, F. Wolle, 30 Aug. 1881 (Type of *G. aponina* var. *cordiformis* Wolle in Witr. & Nordst., Alg. Exs. no. 498, FC [Fig. 178]; isotypes, L. S). MARYLAND: marsh pool between Chance and Dames Quarter, Somerset county, P. W. Wolle, 12 Jun. 1938 (D), P. W. Wolle & Drouet 2260, 22 Aug. 1938 (FC, D, FH). FLORIDA: pools, Long key, Dry Tortugas, W. R. Taylor 22, 501, Jun. 1924 (TA); with *Chara Hornemannii* Wallm., in deep water near bridge, Big Pine key to Torch key, Monroe county, E. P. Killip 41970b, 4 Mar. 1951 (FC, US); freshwater ditch, Hendry creek, about 10 miles south of Fort Myers, Lee county, P. C. Standley 73254, Mar. 1940 (FC); on a tidal flat along East river one mile northeast of St. Marks lighthouse, Wakulla county, Drouet, G. C. Madsen, & D. Crowson 11771, 1 Feb. 1949 (FC, T). OHIO: reservoirs in Eden park, Cincinnati, F. K. Daily, 24 Aug. 1940 (DA, FC), W. A. Daily 177, 404, 406, 24 Oct. 1939, 3 Jul. 1940 (DA, FC), J. B. Lackey, Sept. 1942 (FC). KENTUCKY: wet sandstone and soil, Torrent, Wolfe county, W. A. & F. K. Daily & R. Kosanke 457, 473, 478, 485, 489, 14 Jul. 1940 (DA, FC). MICHIGAN: pond on north side of Mackinac island, F. K. & W. K. Daily 1727, 24 May 1947 (DA, FC); slough on Northport road opposite Cedar lake, Leelanau county, J. H. Hoskins, 30 Aug. 1934 (DA, FC). INDIANA: Lake Cicot 8 miles west of Logansport, Cass county, F. K. & W. A. Daily 1099, 9 Sept. 1942 (DA, FC); Wabec lake southeast of Milford, F. K. & W. A. Daily 2636, 28 Aug. 1952 (DA, FC); in fish-hatchery pond 2 miles northwest of Culver, Marshall county, F. K. & W. A. Daily 1495, 1 Jul. 1946 (DA, FC); Flint lake 3 miles north of Valparaiso, Porter county, F. K. & W. A. Daily 2569, 30 Aug. 1951 (DA, FC); Crooked lake, Steuben county, C. M. Palmer B54, Sept. 1933 (DA, FC); Gentian lake 6 miles north of Angola, F. K. & W. A. Daily 2669, 2675, 24 Aug. 1953 (DA, FC). MINNESOTA: in covered tank, Zoological Laboratory, University of Minnesota, Minneapolis, J. E. Tilden, 20 Apr. 1898 (as *Gomphosphaeria aponina* in Tild., Amer. Alg. no. 300, FC). NEBRASKA: old meander pond of Platte river, Scottsbluff, W. Kiener 22044, 20 May 1947 (FC, KI). TEXAS: on *Digenia simplex* (Wulf.) Ag., Rockport, G. L. Fisher 41090, 14 Aug. 1941 (FC). MONTANA: F. A. Barkley, 1940 (FC); just below forest boundary on Lolo creek, Missoula county, P. H. Rose 4211, 12 Jun. 1941 (FC). NEVADA: Springdale hot springs 10 miles north of Beatty, Nye county, G. Waltenpiel 1740, 8 Feb. 1953 (FC). WASHINGTON: Whidbey island, W. A. Setchell & N. L. Gardner 301, 472 (UC). CALIFORNIA: Bad Water, Death Valley, Inyo county, R. M. Holman & L. Bonar 7213, 2 Apr. 1933 (FC, UC), M. J. Groesbeck 1, 217, 303, Feb., Oct. 1940, 1 Jan. 1941 (FC); in fresh water, Los Angeles, S. P. Monks, Nov. 1895 (UC); in the travertine quarry, Bridgeport, Mono county, Groesbeck 101, 161, 13 Jun. 1940, 3 Sept. 1940 (FC); Monterey, T. E. Hazen (DA, FC); brackish water one mile west of Newport Beach, Orange county, G. J. Hollenberg 447b, 1618, 16 Aug. 1934 (FC, UC); pond north of Torrey Pines state park, San Diego county, W. E. Allen 41a, 8 Dec. 1935 (FC). JAMAICA: Morant cays, V. J. Chapman, 1939 (FC). GUATEMALA: S. E. Meek 84, 1906 (FC, US). ECUADOR: in stagno in Valle de Guano prope Riobamba, G. Lagerheim, Jul. 1891 (as *Gomphosphaeria aponina* in Witr., Nordst., & Lagerh., Alg. Exs. no. 1545, L); salt pool near Albermarle point, north end of Isabela island, Galapagos islands, W. R. Taylor 123, 12 Jan. 1934 (D, TA). ARGENTINA: laguna frente al puerto, Mar del Plata, Buenos Aires, S. A. Guarrera 2729, 6 Apr. 1939 (FC). HAWAIIAN ISLANDS: Niihau island, A. & S. Robinson 33, Dec. 1907 (FC, UC); Hamauma bay, Oahu, W. J. Newbouse 59, 3 May 1953 (FC). MARSHALL ISLANDS: rocks on reef flats, seaward side of Iguir island, Eniwetok atoll, W. R. Taylor 46-316, 22 May 1946 (FC). RYUKYU ISLANDS: Unten, Nakijin-son, Y. K. Okada, 3 Apr.

1937 (as *G. aponina* var. *multiplex* in Okada, Alg. Aq. Japon. no. 2, FC). INDONESIA: Lake Ohoitiel, Kai islands, H. Jensen & O. Hagerup, 1922 (Type of *G. aponina* var. *multiplex* Nyg. in the slide collection of G. Nygaard). WESTERN TIBET: in Kyam Spring, in Chang-chenmo valley north of Pang-gong Tso, G. E. Hutchinson L58, 19 Jul. 1932 (D, DT, FH, L, NY).

FAMILY II. CHAMAESIPHONACEAE

Borzi, N. Giorn. Bot. Ital. 10(3): 298. 1878. *Chamaesiphonaceae* Subfam. *Euchamaesiphonaceae* Hansgirg, Notarisia 3: 588. 1888. —Type genus: *Chamaesiphon* A. Br. & Grun.

Pleurocapsaceae Geitler, Beih. z. Bot. Centralbl., II, 41: 238. 1925. *Chamaesiphonaceae* Subfam. *Cystogoneae* Hansgirg, Notarisia 3: 588. 1888. —Type genus: *Pleurocapsa* Thur.

Entophysalidaceae Geitler, Beih. z. Bot. Centralbl., II, 41: 235. 1925. —Type genus: *Entophysalis* Kütz.

Chlorogloeaceae Geitler, Beih. z. Bot. Centralbl., II, 41: 236. 1925. —Type genus: *Chlorogloea* Wille.

Dermocarpaceae Geitler, Beih. z. Bot. Centralbl., II, 41: 247. 1925. —Type genus: *Dermocarpa* Crouan fr.

Siphononemataceae Geitler, Beih. z. Bot. Centralbl., II, 41: 251. 1925. —Type genus: *Siphononema* Geidl.

Xenococcaceae Ercegovic, Bull. Int. Acad. Yougosl. Sci. & Arts, Cl. Sci. & Math., 26: 38. 1932. —Type genus: *Xenococcus* Thur.

Hyellaceae Ercegovic, Bull. Int. Acad. Yougosl. Sci. & Arts, Cl. Sci. Math. & Nat., 26: 38. 1932. —Type genus: *Hyella* Born. & Flah.

Original specimens of the type species of the type genus of the following family have been unavailable for our study:

Scopulonemataceae Ercegovic, Bull. Int. Acad. Yougosl. Sci. & Arts, Cl. Sci. Math. & Nat., 26: 38. 1932. —Type genus: *Scopulonema* Erceg.

Plantae uni—multi-cellulares, aquaticae, microscopicae vel macrascopicae, cellulis primum solitariis basim ad substratum affixis, unaquidque seriatim in cellulas-filias primo inaequales deinde aequales dividente et mox ab aliis cum gelatino vaginale se separante, deinde sursum supra superficiem substrati radiatim in stratum vel pulvinum solidum et deorsum intus substratum in fila ramosa incrementibus; cellulis quibuspiam se amplificare atque interne in paucas vel multas endosporas se dividere potentibus; reproductione a fragmentatione vel ab endosporis.

In this family, the plants, originally unicellular, grow eventually into strata or cushions from which filaments of cells penetrate the substratum. The solitary cells are basally attached to the substratum by a sheath of gelatinous material; cell division proceeds, at right angles to the axis of the cell, in an unequal fashion: the apical daughter cell is as a rule much smaller than the basal daughter cell. The upper part of the sheath is burst open, and the small daughter cell passes out of the mother cell sheath or develops *in situ* within the open sheath. By aggregate growth of these solitary cells and/or by successive equal divisions of the daughter cells in three planes perpendicular to each other, first a stratum, then a cushion (sometimes large and bullose) of vaguely radial structure is formed. The basal cells of these cushions and strata elongate and grow as uni- or pluriseriate, often branched, filaments downward into the substratum. Any of the solitary cells and any of the cells in the superficial layers of the stratum or cushion may enlarge and divide internally, wholly or in part, into numerous small cells (endospores), each of which is capable of growing as a solitary cell or as an endosporangium. Reproduction takes place also by fragmentation of the cushions. The gelatinous matrix of the cushion often becomes hydrolyzed, and the cells are thus dissociated.

One genus:

Kützing, Phyc. Gener., p. 177. 1843. *Gloeocapsa* Subgenus *Entophysalis* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 69. 1923. —Type species: *Entophysalis granulosa* Kütz.

Hydrococcus Kützing, Linnaea 8: 380. 1833; non Link, 1833. *Chroococcus* Subgenus *Hydrococcus* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 68. 1923. —Type species: *Hydrococcus rivularis* Kütz.

Exococcus Nägeli, Die Neuern Algensyst., p. 170. 1847. —Type species: *E. ovatus* Näg.

Thaumaleocystis Trevisan, Sagg. Monogr. Alg. Coccot., p. 79. 1848. —Type species: *Coccochloris deusta* Menegh.

Dermocarpa Crouan fr., Ann. Sci. Nat. IV. Bot 9: 70. 1858. —Type species: *D. violacea* Crouan fr.

Chamaesiphon A. Braun & Grunow in Rabenhorst, Fl. Eur. Algar. 2: 148. 1865. *Brachytrix* A. Braun pro synonym. in Rabenhorst, loc. cit. 1865. *Chamaesiphon* Sectio *Brachytrix* A. Braun ex Hansgirg, Prodr. Algenfl. Böhmen 2: 124. 1892. *Chamaesiphon* Subgenus *Brachytrix* A. Braun ex Forti, Syll. Myxophyc., p. 138. 1907. *Chamaesiphon* Sectio *Euchamaesiphon* Geitler, Beih. z. Bot. Centralbl., II, 41: 250. 1925. —Type species: *Chamaesiphon confervicola* A. Br.

Sphaerosiphon Reinsch, Contrib. Algol. & Fungol. 1: 15. 1874. —Type species: *S. cuspidatus* Reinsch.

Placoma Schousboe & Thuret in Bornet & Thuret, Notes Algol. 1: 2. 1876. *Gloeocapsa* Subgenus *Placoma* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 69. 1923. —Type species: *Placoma vesiculosa* Schousboe & Thur.

Xenococcus Thuret in Bornet & Thuret, Notes Algol. 2: 73, 75. 1880. —Type species: *X. Schousboei* Thur.

Sphaerogonium Rostafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Mat.-Przyr., 10: 304. 1883. *Chamaesiphon* Sectio *Sphaerogonium* Rostafinski ex Hansgirg, Prodr. Algenfl. Böhmen 2: 123. 1892. *Chamaesiphon* Subgenus *Sphaerogonium* Hansgirg ex Forti, Syll. Myxophyc., p. 136. 1907. —Type species: *Chamaesiphon incrustans* Grun.

Godlewskia Janczewski, Ann. Sci. Nat. VI. Bot. 16: 227. 1883. *Chamaesiphon* Sectio *Godlewskia* Geitler, Beih. z. Bot. Centralbl., II, 41: 250. 1925. —Type species: *Godlewskia aggregata* Jancz.

Pleurocapsa Thuret in Hauck, Meeresalg., p. 515. 1885. —Type species: *P. fuliginosa* Hauck.

Hyella Bornet & Flahault, Journ. de Bot. 2: 163. 1888. —Type species: *H. caespitosa* Born. & Flah.

Cyanoderma Subgenus *Myxoderma* Hansgirg, Notarisia 3: 588. 1888. —Type species: *Cyanoderma rivulare* Hansg.

Radaisia Sauvageau, Journ. de Bot. 9: 374. 1895. —Type species: *R. Gomontiana* Sauvag.

Chlorogloea Wille, Nyt Mag. Naturvid. 38(1): 5. 1900. *Chroococcus* Subgenus *Chlorogloea* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 68. 1923. —Type species: *Palmella tuberculosa* Hansg.

Hyellococcus Schmidle, Allgem. Bot. Zeitschr. 1905: 64. 1906. —Type species: *H. niger* Schmidle.

Guyotia Schmidle, Allgem. Bot. Zeitschr. 1905: 64. 1906. —Type species: *G. singularis* Schmidle.

Siphononema Geitler, Beih. z. Bot. Centralbl. II, 41: 251. 1925; Arch. f. Protistenk. 51: 332. 1925. —Type species: *Pleurocapsa polonica* Racib.

Gloeocapsopsis Geitler, Beih. z. Bot. Centralbl. II, 41: 229. 1925. —Type species: *Protococcus crepidinum* Thur.

Myxobyella Geitler, Beih. z. Bot. Centralbl., II, 41: 246. 1925. —Type species: *Hyella socialis* Setch. & Gardn.

Nematoradaisia Geitler, Beih. z. Bot. Centralbl., II, 41: 242. 1925. —Type species: *Radaisia Laminariae* Setch. & Gardn.

Radaisiella Geitler, Beih. z. Bot. Centralbl., II, 41: 242. 1925. *Geitleriella* J. de Toni, Noter. Nomencl. Algol. 8. 1936. —Type species: *Radaisia subimmersa* Setch. & Gardn.

Chroococcopsis Geitler, Arch. f. Protistenk. 51: 342. 1925; Beih. z. Bot. Centralbl., II, 41: 241. 1925; in Pascher, Süßwasserfl. 12: 125. 1925. —Type species: *C. gigantea* Geitl.

Chamaesiphon Sectio *Brachytrix* Geitler, Beih. z. Bot. Centralbl., II, 41: 250. 1925. —Type species: *Sphaerogonium fuscum* Rostaf.

Chamaesiphonopsis Fritsch, New Phytol. 28: 173. 1929. —Type species: *Xenococcus britannicus* Fritsch.

Cyanodermatium Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 627. 1933. —Type species: *C. gelatinosum* Geitl.

The following generic names have type species for which no original specimens have been available to us:

- Cyanocystis* Borzi, N. Giorn. Bot. Ital. 14: 314. 1882. —Type species: *C. versicolor* Borzi.
Askenasya Möbius, Ber. Deutsch. Bot. Ges. 5: 1xii. 1887. —Type species: *A. polymorpha* Möb.
Chondrocystis Lemmermann, Abh. Nat. Ver. Bremen 16: 353. 1899. *Gloeocapsa* Subgenus
Chondrocystis Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 69. 1923. —Type species:
Chondrocystis Schauinslandii Lemm.
Dermocarpella Lemmermann, Engler Bot. Jahrb. 38: 349. 1907. —Type species: *Chamaesiphon*
hemisphaericus Lemm.
Lithocapsa Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 82. 1925. —Type species: *L.*
fasciculata Erceg.
Lithococcus Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 83. 1925. —Type species: *L.*
ramosa Erceg.
Pseudocapsa Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 95. 1925. —Type species:
P. dubia Erceg.
Solentia Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 2: 78. 1927. —Type species: *S.*
stratosa Erceg.
Aspalatia Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 2: 81. 1927. —Type species: *A. crassior*
Erceg.
Hormathonema Ercegovic, Arch. f. Protistenk. 66: 165. 1929. —Type species: *H. paulocellulare*
Erceg.
Dalmatella Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 4: 39. 1929. —Type species:
D. buensis Erceg.
Tryponema Ercegovic, Arch. f. Protistenk. 66: 168. 1929. —Type species: *T. endoliticum*
Erceg.
Scopulonema Ercegovic, Arch. f. Protistenk. 71: 365. 1930. —Type species: *S. Hansgirgianum*
Erceg.
Podocapsa Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 6: 33. 1931. —Type species: *P.*
pedicellatum Erceg.
Brachynema Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 6: 35. 1931. *Ercegovicia* J. de Toni,
Noter. Nomencl. Algal. 8. 1936. —Type species: *Brachynema litorale* Erceg.
Epilithia Ercegovic, Rad. Jugoslov. Acad. 244 (Razr. Mat.-Prirod. 75): 141. 1932. —Type
species: *E. adriatica* Erceg.

Plantae primo microscopicae aetate provecta macroscopicae, supra et intus substratum increscentes, cellulis solitariis forma diversis; cellulis pulvini sphaericis, ellipticis, cylindraceis, vel polyhedroideis, in seriebus indistincte radialibus vel erectis ordinatis; cellulis filorum intus substratum penetrantium cylindricis, hemisphaericis, sphaericis, ovoideis, vel polyhedroideis; endosporangiis diversiformibus; membrana endosporangii tenue.

All the species of *Entophysalis* are aquatic in at least relatively permanent bodies of water; none appears to survive long in habitats which dry out periodically. The growth-forms commonly encountered differ with the species: in *E. deusta* and *E. rivularis* the strata and cushions are most often seen; in *E. conferta* the endosporangia are the most generally collected growth-forms; in *E. Lemaniae* and *E. rivularis* the solitary vegetative cells are familiar; in *E. endophytica*, *E. deusta*, *E. conferta*, and *E. rivularis* the penetrating filaments are often found.

Key to species of *Entophysalis*:

- | | |
|---|--------------------------|
| 1. Marine | 2. |
| 1. Freshwater | 4. |
| 2. On rocks, wood, and shells | 1. <i>E. DEUSTA</i> |
| 2. On larger algae and living animals | 3. |
| 3. Cells 1—2 μ in diameter; plants yellowish in color | 2. <i>E. ENDOPHYTICA</i> |
| 3. Cells larger; plants blue-green, violet, or red | 3. <i>E. CONFERTA</i> |

4. On rocks, wood, and shells 4. E. RIVULARIS
 4. On larger plants 5. E. LEMANIAE

1. ENTOPHYSALIS DEUSTA Drouet & Daily, Lloydia 11: 79. 1948. *Coccol-
 oris deusta* Meneghini, Atti 2. Riun. Sci. Ital. Torino 1840: 173. 1841. *Micro-
 cystis deusta* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.):
 81. 1843. *Bichatia deusta* Trevisan, Nomencl. Algar. 1: 60. 1845. *Thaumaleo-
 cystis deusta* Trevisan, Sagg. Monogr. Alg. Coccot., p. 79. 1848. *Gloeocapsa deusta*
 Kützinger, Sp. Algar., p. 224. 1849. —Type from Genoa, Italy (FI). FIG. 191.
Myrionema crustaceum J. Agardh, Alg. Mar. Medit. & Adriat., p. 32. 1842. *Entophysalis*
crustacea Drouet & Daily, Butler Univ. Bot. Stud. 10: 222. 1952. —Type from Brioni island, Istria,
 Jugoslavia (LD). FIG. 250.
Palmella mediterranea Kützinger, Phyc. Gener., p. 171. 1843. *Brachia mediterranea* Trevisan,
 Sagg. Monogr. Alg. Coccot., p. 58. 1848. *Palmella submarina* Crouan fr., Fl. Finistère, p. 109.
 1867. —Type from Naples, Italy (L). FIG. 193.
Entophysalis granulosa Kützinger, Phyc. Gener., p. 177. 1843. *Corynephora granulosa* Kützinger
pro *synon.*, loc. cit. 1843. —Type from Split, Jugoslavia (L). FIG. 187.
Protococcus crepidinum Thuret, Mém. Soc. Nat. Sci. Nat. Cherbourg 2: 388. 1854.
Pleurococcus crepidinum Rabenhorst, Fl. Eur. Algar. 3: 25. 1868. *Gloeocapsa crepidinum* Thuret
 in Bornet & Thuret, Notes Algol. 1: 1. 1876. *Chroococcus crepidinum* Hansgirg, Physiol. & Algol.
 Stud., p. 97, 152. 1887. *Pleurocapsa crepidinum* Ercegovic, Arch. f. Protistenk. 71: 364. 1930.
P. Ercegovicii J. de Toni, Noter. Nomencl. Algol. 1: 7. 1934. —Type from Cherbourg, France
 (PC). FIG. 186.
Dermocarpa violacea Crouan fr., Ann. Sci. Nat. IV. Bot. 9: 70. 1858. —Type from Brest,
 France (PC).
Palmella oceanica Crouan fr., Fl. Finistère, p. 110. 1867; Crouan fr. in Desmazières, Pl.
 Cryptog. France, ed. 2, no. 535. —Type from near Brest, France (PC). FIG. 190.
Placoma vesiculosa Schousboe & Thuret in Bornet & Thuret, Notes Algol. 1: 2. 1876. —Type
 from Tangier (PC).
Pleurocapsa fuliginosa Hauck, Meeresalg. Deutschl. & Oesterr., p. 515. 1885. —Type from
 Trieste (L). FIG. 189.
Hyella caespitosa Bornet & Flahault, Journ. de Bot. 2: 163. 1888. —Type from Le Croisic,
 France (PC).
Xenococcus concharum Hansgirg, Oesterr. Bot. Zeitschr. 39: 5. 1899. —Type from Zadar,
 Jugoslavia (W). FIG. 192.
Pleurocapsa fluvialis var. *subsalsa* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl.,
 1890(1): 18. 1890. *Oncobrysa rivularis* var. *subsalsa* Hansgirg ex Forti, Syll. Myxophyc., p. 115.
 1907. —Type from near Parenzo, Istria, Jugoslavia (W). FIG. 188.
Aphanocapsa concharum Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(1):
 19. 1890. —Type from Pola, Jugoslavia (W). FIG. 247.
Hyella caespitosa var. *spirorbicola* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl.,
 1892: 226. 1892. —Type from Ragusa, Jugoslavia (W).
Aphanocapsa litoralis Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 229.
 1892. —Type from Pola, Jugoslavia (W). FIG. 248.
Aphanocapsa litoralis var. *macrococca* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat.
 Cl., 1892: 229. 1892. —Type from Pirano, Trieste (W).
Chroococcus atrochalybeus Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892:
 230. 1892. —Type from Orsera, Istria, Jugoslavia (W). FIG. 194.
Hyella caespitosa var. *nirida* Batters, Journ. of Bot. 34: 385. 1896. —Type from Plymouth,
 England (BM).
Pleurocapsa crepidinum Collins, Rhodora 3: 136. 1901. —Type from Magnolia, Massachusetts
 (FH).
Hyella Balanii Lehmann, Nyt Mag. Naturvid. 41: 85. 1903. —Topotypes and paratypes
 from near Aalesund, Norway (D, FC, L, NY, WU). FIG. 185.
Entophysalis violacea Weber-van Bosse, Siboga Exped., Liste des Algues 1: 7. 1913. —Type from
 Solor island, Indonesia (L).
Pleurocapsa magna Weber-van Bosse, Siboga Exped., Liste des Algues 1: 9. 1913. —Type
 from Solor, Indonesia (L).
Hyella Litorinae Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 441. 1918. —Type from
 Carmel, California (UC).
Placoma violacea Setchell & Gardner in Gardner, Univ. Calif. Publ. Bot. 6: 456. 1918.
 —Type from Neah bay, Washington (UC).

Pleurocapsa entophysaloides Setchell & Gardner in Gardner, Univ. Calif. Publ. Bot. 6: 463. 1918. —Type from Carmel bay, California (UC).

Pleurocapsa gloeocapsoides Setchell & Gardner in Gardner, Univ. Calif. Publ. Bot. 6: 465. 1918. *Gloeocapsa gloeocapsoides* Geitler ex J. de Toni, Diagn. Alg. Nov., I. Myxophyc 2: 135. 1937. —Type from Alameda, California (UC).

Gloeocapsa bahamensis Collins in Britton & Millspaugh, Bahama Fl., p. 619. 1920. —Type from Mariguana, Bahama islands (NY).

Entophysalis violacea Collins, in Britton & Millspaugh, Bahama Fl., p. 619. 1920. *E. Collinsii* J. de Toni, Noter. Nomencl. Algal. 1: 6. 1934. —Type from Atwood cay, Bahama islands (NY).

Polycystis clarionensis Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 22: 66. 1937.

Microcystis clarionensis J. de Toni, Diagn. Algal. Nov., I. Myxophyc. 5: 494. 1938. —Type from Clarion island, Revilla Gígedo islands, Mexico (CAS).

Dermocarpa sphaerica var. *galapagensis* Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 22: 67. 1937. —Type from Narborough island, Galapagos islands (CAS).

Chroococcus calcicola Anand, Journ. of Bot. 1937 (Suppl. 2): 37. 1937. —Type from Westgate, England (in collection of F. E. Fritsch). FIG. 249.

Myxohyella seriata Hollenberg, Bull. Torr. Bot. Club 66: 489. 1939. —Type from San Pedro, California (in the herbarium of G. J. Hollenberg).

Entophysalis marginalis Hollenberg, Bull. Torr. Bot. Club 66: 490. 1939. —Type from San Pedro, California (in the herbarium of G. J. Hollenberg).

Microcystis splendens Hollenberg, Bull. Torr. Bot. Club 66: 493. 1939. —Type from culture at La Verne, California (in the herbarium of G. J. Hollenberg).

Microcystis ovalis Hollenberg, Bull. Torr. Bot. Club 66: 493. 1939. —Type from culture in La Verne, California (in the herbarium of G. J. Hollenberg).

Pleurocapsa Deeveyi Drouet, Field Mus. Bot. Ser. 20: 126. 1942. —Type from Willacy county, Texas (FC).

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Haematococcus dalmaticus Zanardini, Sagg. di Class. d. Ficee, p. 64. 1843. *Protosphaeria dalmatica* Trevisan, Sagg. Monogr. Alg. Coccot., p. 28. 1848.

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Palmella crustacea Zanardini, N. Giorn. Bot. Ital. 10: 40. 1878.

Hyella voluticola Chodat, Bull. Herb. Boissier, ser. 1, 5: 716. 1897.

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Solentia stratosa Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 2: 78. 1927.

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Scopulonema Hansgirgianum Ercegovic, Arch. f. Protistenk. 71: 365. 1930.

Hormathonema luteo-brunneum Ercegovic, Arch. f. Protistenk. 71: 372. 1930.

Hormathonema violaceo-nigrum Ercegovic, Arch. f. Protistenk. 71: 372. 1930.

Solentia foveolarum Ercegovic, Arch. f. Protistenk. 71: 374. 1930.

Podocapsa pedicellatum Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 6: 33. 1931.

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Synechococcus marinus Ercegovic, Rad Jugoslav. Akad. 244 (Razr. Mat.-Prirod. 75): 138. 1932.

Chroococcus membraninus var. *salinus* Ercegovic, Rad Jugoslav. Akad. 244 (Razr. Mat.-Prirod. 75): 138. 1932.

Entophysalis major Ercegovic, Rad Jugoslav. Akad. 244 (Razr. Mat.-Prirod. 75): 139. 1932.

Pleurocapsa fissurarum Ercegovic, Rad Jugoslav. Akad. 244 (Razr. Mat.-Prirod. 75): 140. 1932.

Epilithia adriatica Ercegovic, Rad Jugoslav. Akad. 244 (Razr. Mat.-Prirod. 75): 141. 1932.

Scopulonema mucosum Ercegovic, Rad Jugoslav. Akad. 244 (Razr. Mat.-Prirod. 75): 144. 1943.

Scopulonema Hansgirgianum f. *roseum* Ercegovic, Rad Jugoslav. Akad. 244 (Razr. Mat.-Prirod. 75): 144. 1932.

Scopulonema brevissimum Ercegovic, Rad Jugoslav. Akad. 244 (Razr. Mat.-Prirod. 75): 145. 1932.

Hyella dalmatica Ercegovic, Rad Jugoslav. Akad. 244 (Razr. Mat.-Prirod. 75): 147. 1932.

Hyella tenuior Ercegovic, Rad Jugoslav. Akad. 244 (Razr. Mat.-Prirod. 75): 147. 1932.

Dalmatella polyformis Ercegovic, Rad Jugoslav. Akad. 244 (Razr. Mat.-Prirod. 75): 149. 1932.

- Dalmatella violacea* Ercegovic, Rad Jugoslov. Akad 244 (Razr. Mat.-Prirod. 75): 150. 1932.
Dalmatella anomala Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 151. 1932.
Dalmatella lioralis Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 151. 1932.
Solentia achromatica Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 153. 1932.
Hormathonema sphaericum Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 155. 1932.
Hormathonema longicellulare Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 155. 1932.
Hormathonema epilithicum Ercegovic, Rad Jugoslov. Akad. 244 (Razr. Mat.-Prirod. 75): 155. 1932.
Pleurocapsa minuta Geitler, Rabenh. Krypt.-Fl. 14: 355. 1932. *Scopulonema minutum* Geitler in Engler & Prandl, Natürl. Pflanzenfam., ed. 2, lb: 93. 1942.
Aphanocapsa Roberti-Lamii Frémy, Mém. Soc. Nat. Sci. Nat. & Math. Cherbourg 41: 16. 1934.
Aphanocapsa endolithica var. *marina* Frémy, Mém. Soc. Nat. Sci. Nat. & Math. Cherbourg 41: 17. 1914.
Myxosarcina salina Frémy in J. de Toni, Diagn. Algar. Nov. I, Myxophyc. 8: 702. 1946.
Nematoradaisia gasteropodum Gonzalez Guerrero, Anal. Jard. Bot. Madrid 7: 438. 1947.
Aspalatia andalousica Gonzalez Guerrero, Anal. Jard. Bot. Madrid 7: 438. 1947.
Xenococcus gaditanus Gonzalez Guerrero, Anal. Jard. Bot. Madrid 7: 438. 1947.
Dermocarpa gaditana Gonzalez Guerrero, Anal. Jard. Bot. Madrid 7: 442. 1947.

Plantae in stratum aut pulvinum microscopicum vel macroscopicum aerugineum, olivaceum, violaceum, roseum, brunneum, vel nigrum, firmum vel molle vel dissolvens increscentes, cellulis solitariis sphaericis, ovoideis, vel pyriformibus, diametro ad 10μ crassis; cellulis pulvini sphaeroideis, post divisiones praecipue polyhedroideis, diametro (1—)3— 6μ crassis; cellulis filorum intus substratum penetrantium ovoideis, sphaericis, cylindraceis, vel polyhedroideis, vulgo uniseriatis interdum multiseriatis, diametro (1—)2— 15μ crassis; endosporangiis sphaericis vel ovoideis, diametro ad 30μ crassis; gelatino vaginale primum hyalino demum lutescente vel raro rubrescente vel coerulescente, homoganeo vel lamelloso; protoplasmae aerugineo, olivaceo, luteolo, violaceo, vel roseo, vulgo homoganeo. FIGS. 185—194, 247—250.

Intertidal or below low tide mark on marine rocks, shells, wood, and soil, and on similar substrata in brackish water. If the substratum has been transported to a freshwater habitat, apparently this alga persists for a considerable period. The stratum or cushion type of growth-form, often with well developed filaments penetrating the substratum, is most usually encountered in *Entophysis deusta*. On limestone and shells, a profusion of basal filaments is formed; whereas on igneous rocks and wood, these structures are either not produced or are restricted to elongated cells at the base of the stratum or cushion. Where the species persists after being introduced into freshwater habitats, the plants often simulate *Anacystis montana*. Strata on intertidal soil may sometimes appear very similar to those of *Coccochloris stagnina*. Below low tide level and in tide pools and brackish ponds, the gelatinous matrix of the upper layers of the stratum or cushion may hydrolyze, and the cells may appear very much like those of *Anacystis aeruginosa*. Fragments of the stratum or cushion may be mistaken as plants of *Anacystis dimidiata*, *A. thermalis*, *A. montana*, or *Palmogloea protuberans* (Sm. & Sow.) Kütz.

Fungi are often found parasitizing the cells; and according to Bornet & Thuret, Notes Algol. 1: 2 (1876), species of *Verrucaria* result from such parasitization.

Specimens examined:

NORWAY: Tromsø, *M. Foslie*, 10 Jun. 1887 (PC); in conchis Balanorum, Sliningen prope Aalesund, N. Wille (topotype and paratype of *Hyella Balanii* Lehm. in Mus. Vindob. Krypt. Exs. no. 2050, D [Fig. 185], FC, L, NY, WU). SWEDEN: Graen, Landskrona, Scania, *O. Nordstedt*, 1879

(D. S.). DENMARK: in herb. Lyngbye (C). ROMANIA: apud Constanta, ad scopulos Ponti Euxini, E. C. Teodorescu 485, Apr. 1897 (W). JUGOSLAVIA: Istria: insula Brioni, Biasoletto (Type of *Myrionema crustaceum* J. Ag., LD [Fig. 250]); Fasana bei Pola, A. Hansgirg, Apr. 1889 (FC, W); Lussin, Hansgirg, Aug. 1888 (FC, W); auf Patella u. ä. Schalen an der Flutgrenze selten bei Orsera, Hansgirg, Apr. 1889 (Type of *Chroococcus atrochalcus* Hansg., W; isotype, FC [Fig. 194]); auf Steinen in einem Bache, welcher in adriatisches Meer fließt und angesalztes Wasser führt, zwischen Parenzo und Orsera, Hansgirg, Apr. 1889 (Type of *Pleurocapsa fluvialis* var. *subsals* Hansg., W; isotype, FC [Fig. 188]); im adriatischen Meere, Umgebung von Pola, Hansgirg, Apr. 1889 (Type of *Aphanocapsa concharum* Hansg., W; isotype, FC [Fig. 247]); auf unreinen Molosteinen zwischen Flut- und Ebberspiegel bei Pola, Hansgirg, Aug. 1888 (Type of *A. litoralis* Hansg., W; isotype, FC [Fig. 248]); Pola, Hansgirg, Apr. 1889 (FC, W); Rovigno, Hansgirg, Apr. 1889 (FC, W); Volosca, Hansgirg, Aug. 1885 (FC, W). Croatia: Fiume, Hansgirg, Aug. 1885 (FC, W). Dalmatia: Castelnuovo, Cannosa prope Ragusa, Gravosa prope Ragusa, Hansgirg, 1891 (FC, W); op kleine kalkrotsen, Promaina, noord van Makarska, J. J. ter Pelkewijk, 21 Jul. 1939 (FC, L); an Spirorbis-Schalen bei Ragusa, Hansgirg, 1891 (Type of *Hyella caespitosa* var. *spirorbicola* Hansg., W; isotype, FC); ad rupes maritimas prope Spalatam, F. T. Kützing, 1835 (Type of *Entophysalis granulosa* Kütz., L [Fig. 187]; isotype, PC); Spalato, Hansgirg, Aug. 1889 (FC, W); Stagno Piccolo, Hansgirg, 1891 (FC, W); Zara, Hansgirg (PC); am Meeresufer bei Zara, Hansgirg, Aug. 1888 (Type of *Xenococcus concharum* Hansg., W; isotype, FC [Fig. 192]). TRIESTE: ad Miramar prope Triest, F. Hauck, Sept. 1878 (as *Entophysalis granulosa* in Witttr. & Nordst., Alg. Exs. no. 294, FC, L, MIN); Muggia, Hauck, 19 Mar. 1879 (L, PC), 2 Oct. 1887 (DT, FH; as *E. granulosa* in Hauck & Richt., Phyk. Univ. no. 241b, L, MIN, PC); auf unreinen Molosteinen bei Pirano, Hansgirg, Apr. 1889 (Type of *Aphanocapsa litoralis* var. *macrocoeca* Hansg., W; isotype, FC); Servola, Hauck, Mar. 1883 (L; as *Entophysalis granulosa* in Hauck & Richt., Phyk. Univ. no. 241a, L, MIN, PC); St. Andrea, Hansgirg, 1891 (FC, W); salinae ad Strogiano, Hansgirg, Apr. 1889 (FC, W); Triest, Hauck (Type of *Pleurocapsa fuliginosa* Hauck, L [Fig. 189]; isotype, UC).

ITALY: Genova, Meneghini (Type of *Coccolithus deusta* Menegh., FI; isotypes, L [Fig. 191], PC, UC); Mergellina bij Napoli, J. T. Koster 205, Apr. 1939 (L); Principia di Posilippo, Koster 281, May 1939 (L); Neapel, F. T. Kützing (Type of *Palmella mediterranea* Kütz., L [Fig. 193]; isotype, UC). NETHERLANDS: zeedijk van Morsele, Zuid Beveland, C. Brakman 64, Jan. 1941 (L); Ymuiden, A. Weber-van Bosse 1228, Sept. 1893 (L); Sloedam, Brakman 63, Sept. 1940 (L); zeedijk, Walcheren, Brakman 62, Feb. 1941 (L); Zuid-Sloe, Walcheren, Brakman 345a, May 1942 (L); Vlieland, Weber-van Bosse, May 1891 (L). BRITISH ISLES: Plymouth, E. A. Batters, Feb. 1896 (Type of *Hyella caespitosa* var. *nitida* Batt., in the slide collection, BM); chalk cliffs at Westgate, Anand, Dec. 1935 (Type of *Chroococcus calcicola* Anand in the collection of F. E. Fritsch; isotype, D [Fig. 249]); Point of Ayr, Flintshire, Batters, 20 Jul. 1886 (PC). FRANCE: Alpes Maritimes: Antibes, baie de l'Olivette, E. Bornet, 1 Mar. 1872, 23 Dec. 1875 (PC), Plage des Mielles, Bornet, 17 Jan. 1872 (PC), ad rupes maritimas, Bornet, 2 & 5 Mar. 1872 (FH, L, UC), ad lapides submersas in limite maris, Bornet, Dec. 1875 (as *Entophysalis granulosa* in Witttr., Nordst., & Lagerh., Alg. Exs. no. 1200, L, MIN, S); in testis Balanorum ad Trayas, G. Lagerheim, Feb. 1893 (as *Hyella caespitosa* in Witttr., Nordst., & Lagerh., Alg. Exs. no. 1199, L, WU). Basses Pyrénées: Biarritz, Bornet & G. Thuret, 19 Jun. 1868 (FC, L, PC), 19 Jul. 1870 (FC, FH, NY, PC), Jul. 1870 (as *Placoma vesiculosa* in Lloyd, Alg. de l'Ouest de Fr. no. 461, PC), 5 Jun. 1870 (FC); à Guethary, C. Sauvageau, Jul.-Aug. 1896 (FH, NY); Saint Jean de Luz, Jetée Sainte Barbe, J. Feldmann (as *P. vesiculosa* in Hamel, Alg. de Fr. no. 1, MICH). Calvados: Arromanches (DT), Lebel 431 (L). Finistère: sur des fragments de faïence dans le rade de Brest, Crouan (Type of *Dermocarpa violacea* Crouan fr., PC); sur les bords de la rivière marine de Penfield près Brest, Crouan (Type of *Palmella oceanica* Crouan fr., PC [Fig. 190]; isotype in Desmaz., Pl. Cryptog. Fr., ed. 2, no. 535, UC), 3 Nov. 1855 (FC); Brest, Le Dantec, 1888 (PC); Roscoff, G. Thuret, Oct. 1887 (PC). Hérault: Port de Cette, C. Flabault, Jun. 1882 (FH, S), 25 Dec. 1887 (PC), Flabault 165, 13 Jan. 1882 (PC). Ille et Vilaine: au quai de la plage des bains, St. Malo, Bornet, 19 Jun. 1972 (PC). Loire Inférieure: Le Croisic, Bornet, Sept. 1887 (Type of *Hyella caespitosa* Born. & Flah., PC; isotype, LD). Manche: Cherbourg, herb. Lebel no. 636 (FC); Cherbourg, sur les murs des quais, G. Thuret, 2 May 1854 (Type of *Protococcus crepidinum* Thur., PC; isotypes, FC, FH, L [Fig. 186], and as *Gloeocapsa crepidinum* in Witttr. & Nordst., Alg. Exs. no. 1100, L, S; as *Protococcus crepidinum* in Rabenh. Alg. no. 2032, FC, FH, L, PC, UC; as *P. crepidinum* in Le Jolis, Alg. Mar. de Cherbourg no. 16, L, PC); Cherbourg, A. Le Jolis 449 (L, NY), 589 (L), 1561 (L), 1562 (DT, FH), 1563 (FH, L), May 1850—59.

SPAIN: San Vicente de la Barquera, C. Sauvageau, Sept. 1896 (PC). PORTUGAL: cultures from Serubal, L. G. M. Baas Becking, Sept. 1937 (L). TUNISIA: cote à Monastir, M. Serpette T6, Mar. 1947 (D). TANGIER: Tingi, P. K. A. Schousboe, Mar. 1827 (Type of *Placoma vesiculosa* Schousb. & Thur., PC; isotype, C); Algah et Dar Hamra prope Tanger, Schousboe, Mar., Dec. 1827 (PC, S). SIERRA LEONE: marine, Goderich, Freetown, G. W. Lawson A628, 6 Jul. 1953 (FC). GOLD COAST: Teshie, Lawson A359, 29 Jan. 1952 (FC); Sekondi, Lawson A447, 15 Dec. 1952 (D); Accra Beach, Lawson A553, 13 Mar. 1953 (FC). BELGIAN CONGO: crusts in salt water, J. J. Symoens 430 (FC). CAPE OF GOOD HOPE: Knysna, A. Weber-van Bosse, 1894-95 (FC, L);

Mossel bay, *W. A. Setchell*, 12 May 1927 (FC, UC); on rocks, Muizenberg, *Setchell*, 19 May 1927 (FC, UC). BERMUDA: intertidal, Castle island, *T. A. & A. Stephenson* BRCA6, BRCA7, 22 Jul. 1952 (FC); on limestone and concrete, west end of the Causeway between St. Davids and Hamilton islands, *A. J. Bernatowicz* 50-528, 27 Dec. 1950 (FC); Cobbler's island, *Stephenson* BRC13, 4 Jul. 1952 (FC); Gibbet island, *Stephenson* BRG3, 6 Jul. 1952 (FC); crusts in pools, Gravelly bay, Hamilton island, *Bernatowicz* 49-1584, 5 May 1949 (FC); North Rock, *Stephenson* BRN7, 7-8 Jul. 1952 (FC); Smiths island, *Stephenson* BRS2, 7 Aug. 1952 (FC); Whalebone bay, St. Georges island, *Bernatowicz* 49-91, *W. R. Taylor & Bernatowicz* 49-95, 26 Feb. 1949 (FC), *Stephenson* BRW5a,c,d, 12 Jul. 1952 (FC). NOVA SCOTIA: on littoral rocks, Peggy's Cove, Halifax county, *T. A. & A. Stephenson* NSP1a, Jul.—Sept. 1948 (FC); in tidepool and on shells, *R. A. Lewin*, 3 Oct. 1952, Jul. 1953 (FC). MAINE: Eastport, *W. G. Farlow* (FC, FH, L, NY, PC); on shell, South Harpswell, *F. S. Collins* 4704, Jul. 1903 (NY); Harpswell, *Collins* 4813 (NY); in tidepool, Center, *Collins*, Jul. 1892 (FH); Cutler, *Collins* 4350, Jul. 1902 (UC); Portland, *Collins* 3, Jul. 1881 (FH); Seal cove, Mount Desert island, *W. R. Taylor*, Sept. 1920 (TA); on Spirorbis, Spectacle island, *Collins* (FH); in dead shells, Spectacle island, *Collins*, Jul. 1894 (as *Hyella caespitosa* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 302, L, TA, WU); Eagle island, Penobscot bay, *Collins*, Jul. 1892 (as *Chroococcus cohaerens* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 701, FC, FH, L, NY, TA), Jul. 1896 (as *Gloeocapsa crepidinum* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 351, FC, D, L, NY, TA), *Collins* 701 (FH), 2137, 2138 (NY), 2139 (NY, UC), Jul. 1891; Cape Rosier, *Collins* 1132, 2442 (FH, NY), 2695 (NY), *Collins*, Jul. 1894 (as *Entophysalis granulosa* in Coll., N. Amer. Alg. no. 1, NY), Jul. 1895 (as *E. granulosa* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 152a, FC, FH, L, NY, TA), Jul. 1896 (as *Polycystis elabens* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1101, FC, FH, NY, TA), 14 Jul. 1898 (as *Chroococcus minutus* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 951, FC, D, L, MICH).

MASSACHUSETTS: Lackey's bay, Elizabeth islands, *W. R. Taylor*, Jul. 1938 (TA); in shells, Black Rock, Fairhaven, *Taylor*, 27 Jul. 1938 (FC, TA); Sciticut Neck, Fairhaven, *Taylor*, Jul. 1941 (TA); on rocks, Quisset Harbor, Falmouth, *F. Drouet* 1919, 17 Aug. 1936 (D); in pools between Chara pond and Vineyard sound, Falmouth, *Drouet* 2187, 8 Sept. 1937 (D, FH, NY, S, UC); Gloucester, *W. G. Farlow* (FH, L, NY, S; as *Gloeocapsa crepidinum* in Farl., Anders., & Eat., Alg. Exs. Amer. Bor. no. 180, FC, NY, PC, UC); Kettle island, Magnolia, *Farlow*, Sept. 1903 (FH, WU); on Balanus and rocks near exit of drain pipe, Magnolia Point, *Farlow*, Sept. 1903 (Type of *Pleurocapsa crepidinum* Coll., FH; isotypes, FC, PC, and in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1157, FC, FH, L, TA, WU); Marblehead, *Collins*, 17 Jun. 1902 (FC, UC); on rock in marsh pool, *Collins*, Sept. 1902 (NY, UC); Medford, *Collins*, May 1887 (NY); Kettle cove, Naushon island, *I. F. Lewis*, Aug. 1921 (TA); in shells, Meganset Beach, North Falmouth, *Taylor*, 21 Jul. 1931 (FC, L, TA); Penikese island, Gosnold, *M. S. Doty et al.* 7018, 7283—7285, 7295, Jul.—Sept. 1947, *Taylor et al.* 7273, 7279, 7300, 3 Aug. 1947 (FC); in marsh pool, Point of Pines, Revere Beach, *Collins* 4661, 8 May 1904 (FC, UC); Rockport, *Collins* 1525, Apr. 1890 (NY); Bakers island, Salem, *Collins* 1865, Jul. 1890 (NY); on bridge over ditch, Wellington, *Collins* (NY); Woods Hole, *Farlow*, Aug. 1876 (FH); in shells on beach, *W. A. Setchell* 837, 25 Aug. 1894 (FC, UC). RHODE ISLAND: on rocks, Grove point, Block island, *Drouet* 3658, 13 Jul. 1941 (FC); bottom of pool, Bateman's beach, Newport, *Farlow*, Jul. 1878 (FH); Silver Spring, *Collins* 5404, Apr. 1906 (NY); rocks, Newport, *Collins*, Jun. 1883 (NY, UC), *Collins* 4495 (FC, NY, UC), 4497, 4498 (FC, UC), May 1904.

CONNECTICUT: on stones and woodwork, Bridgeport, *I. Holden* 906, 907, 25 Dec. 1893 (C; as *Pleurocapsa fuliginosa* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 101a,b, FC, L, TA, WU), *Holden* 596, May 1892 (FH, NY), *Holden* 968, Aug. 1894 (UC); Seaside park, Bridgeport, *Holden* 766 (NY, UC), 770 (UC), 773 (NY, UC), 778 (NY), Nov., Dec. 1892, *Setchell* 733, 22 Oct. 1893 (FC, UC); Middle Ground light, Bridgeport, *Holden*, Sept. 1890 (FH); Fairfield, *L. N. Johnson* 1022, 30 Aug. 1893 (FC); on shells, Ram island, *Setchell* 711, 13 Sept. 1893 (FC, UC); Stratford, *Johnson*, Aug. 1893 (FH); on stones, Fresh pond, Stratford, *Holden* 709, Sept. 1892 (FH), *Holden* 870 (FH), *Holden* 1132, 11 Aug. 1895 (FH; as *Entophysalis granulosa* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 152b, FC, D, L, TA). NEW JERSEY: Atlantic City, *S. R. Morse*, Apr. 1888 (NY, PC), Jun. 1888 (L), *Collins*, Spring 1891 (FC, UC), *Collins* 2088—2091, May 1891 (NY); beach on Delaware bay, Cape May point, *W. R. Taylor*, Apr. 1922 (TA). DELAWARE: on wooden jetty near Hotel Henlopen, Rehoboth Beach, *Drouet & H. B. Louderback* 8562, 24 Aug. 1948 (FC). MARYLAND: on hardened soil, shore of Tangier sound near Prickly point, Fairmount, *Drouet & P. W. Wolle* 3642, 23 Jul. 1940 (FC); on mud, Wenona, Somerset county, *Wolle & Drouet* 2275, 22 Aug. 1938 (D); in Patuxent river, Solomons Island, *Drouet*, *E. P. Killip*, & *F. R. Fosberg* 3995, 3995a, 26 Jul. 1941 (FC, US); salt marsh flat, Chesapeake Beach, Calvert county, *E. C. Leonard* 18741, 17 Aug. 1939 (FC, US). VIRGINIA: York river at Yorktown, *J. C. Strickland* 1218, 22 Jul. 1942 (FC, ST), *H. J. Humm*, 2 Mar. 1948 (FC). NORTH CAROLINA: on wooden breakwater, Wrightsville Beach, New Hanover county, *H. J. Humm* C, 24 May 1946 (FC); near Beaufort, *T. A. & A. Stephenson* BM(S)11, BSB8, Apr.—May 1947 (FC, UC); Shackleford breakwater, Beaufort, *C. S. Nielsen & Humm* 1645, 6 Aug. 1949 (FC, T); beach near Duke University Laboratory pier, Beaufort, *Humm*, 15 Jan. 1949 (FC); on shells, Pivers island,

Beaufort, *H. L. Blomquist* 13697, 26 Jun. 1945 (FC); breakwater, Bogue sound north of Fort Macon, Beaufort, *Humm*, 28 Apr. 1947 (FC); Harkers Island, Carteret county, *Blomquist* 13702, 25 Aug. 1935 (FC), *Humm & Nielsen* 1728, 10 Aug. 1949 (FC, T). GEORGIA: salt creeks, Darien, *H. W. Ravenel* 308 (PC).

FLORIDA: Bay county: St. Andrews bay, Cove Hotel, Panama City, *Drouet & Nielsen* 11626, 30 Jan. 1949 (FC, T); St. Andrews bay at Hathaway bridge west of Panama City, *Drouet & Nielsen* 10927, 15 Jan. 1949 (FC, T), *G. C. Madsen, A. L. Pates, M. N. Hood, & L. Elias* 1941, 11 Sept. 1949 (FC, T). Broward county: in the Intracoastal waterway, Dania Beach, *Drouet & H. B. Louderback* 10265, 28 Dec. 1948 (FC); in mangrove swamp south of South lake, Hollywood, *Drouet* 10306, 10311, 29 Dec. 1948 (FC). Collier county: Marco Island, *P. C. Standley* 92803, 92818, 92820, 92822, 92823, 92840, 14 Mar. 1946 (FC). Dade county: Cocanut Grove, Soldier's key, and Cape Florida, *R. Thaxter*, 1897 (FH); Biscayne bay, Cutler, *H. J. Humm*, 10 & 13 Jan. 1946 (FC); on coral among mangroves, Miami, *M. A. Howe* 2794, Mar. 1904 (D, NY). Duval county: jetty of St. Johns river mouth and pier 2 miles south, *Humm*, 19 Mar. 1948 (FC). Escambia county: on shells in Pensacola bay north of the bridge on U. S. highway 98, Pensacola, *Drouet, Nielsen, Madsen, D. Crowson, & Pates* 10619a, 8 Jan. 1949 (FC, T). Franklin county: on the west side of East point, southwest of Eastpoint, *Drouet & Nielsen* 11668, 31 Jan. 1949 (FC, T), *Madsen, Pates, Hood, & Elias* 1951, 11 Sept. 1949 (FC, T); shore west of Apalachicola, *Drouet & Nielsen* 11655, 31 Jan. 1949 (FC, T); docks in New river, Carrabelle, *Drouet & Nielsen* 10968, 16 Jan. 1949 (FC, T); at the mouth of New river, Carrabelle, *Drouet & Nielsen* 11674, 31 Jan. 1949 (FC, T); shore in southeast part of Apalachicola, *Drouet & Nielsen* 11001b, 16 Jan. 1949 (FC, T); north shore of St. Vincent sound about 10 miles west of Apalachicola, *Drouet & Nielsen* 10973, 16 Jan. 1949 (FC, T). Gulf county: shore in the municipal park, Port St. Joe, *Drouet & Nielsen* 10946a, 15 Jan. 1949 (FC, T). Lee county: Bonita Beach, *Standley* 92797, 10 Mar. 1946 (FC). Levy county: on shell, Cedar keys, *M. A. Brannon* 301, 6 Jun. 1945 (FC PC); Way key, Cedar keys, *Drouet & Nielsen* 11105, 11118, 11147a, 11155, 11158a, 11164, 11177, 11193, 22 Jan. 1949 (FC, T). Monroe county: saline flats, Big Pine key, *E. P. Killip & J. F. Macbride*, Apr. 1951 (FC), *Killip* 41765, 41810, 41858, 41950, Jan.—Feb. 1952 (FC, US); plaster on stairway, Fort Jefferson, Garden key, Dry Tortugas, *W. R. Taylor* 318, 21 Jul. 1924 (FC, TA); corals and conch shells, Loggerhead and Garden keys, Dry Tortugas, *Taylor* 505, 1061, Jun. 1924, 1925 (TA); beachrock, west side of Loggerhead key, *R. N. Ginsburg* 501, Apr. 1952 (FC); Key Largo and North Key Largo, *Ginsburg* LSI—3, 1952 (FC); Largo sound, *L. B. Isham* 26, Nov. 1952 (FC); in brackish pond, Key West, *M. A. Howe* 1736, 14 Nov. 1902 (D); Plantation key, *T. A. & A. Stephenson* PKIIA, Jan.—Mar. 1947 (FC, UC); Saddlebunch keys, *J. A. Steyermark* 63207b, 63208a, 11 Mar. 1946 (FC); Soldier key, *Stephenson* SKIIIc, *SKIIIc*a, Jan.—Mar. 1947 (FC, UC); Teatable key, *Isham* 24, 1952 (FC); brackish pond, Key Vaca near Marathon, *Ginsburg* NM1, NM2, Apr. 1952 (FC). Okaloosa county: in Choctawhatchee bay at east end of Santa Rosa island, *Drouet, Nielsen, Madsen, Crowson, & Pates* 10637, 9 Jan. 1949 (FC, T); in Santa Rosa sound, Fort Walton, *Drouet, Nielsen, Madsen, Crowson, & Pates* 10655a, 9 Jan. 1949 (FC, T). Palm Beach county: in Lake Worth, West Palm Beach, *Drouet & Louderback* 10193, 10196a, 10197, 23 Dec. 1948 (FC); in Lake Worth, Palm Beach, *Drouet & Louderback* 10219, 24 Dec. 1948 (FC). St. Johns county: bay between Fort Marion and bridge in St. Augustine, *Madsen, Pates, & S. Parker* 2035, 2036a, 2 Jan. 1950 (FC, T); beach, northeast side of Anastasia island, *Madsen, Pates, & M. E. Thomas* 2043, 2 Jan. 1950 (FC, T). Taylor county: shore of Steinhatchee river, Steinhatchee, *Drouet & Nielsen* 11231, 23 Jan. 1949 (FC, T). Volusia county: in shells, Mosquito inlet, New Smyrna beach, *Humm* 9, 28 Feb. 1946 (FC); Marineland, Daytona Beach, *T. A. & A. Stephenson* MIB, 20—29 Mar. 1947 (FC). Wakulla county: jetty, St. Marks lighthouse, *Nielsen & Crowson*, May 1949 (FC, T); Live Oak point, *Nielsen, R. W. Hanks, & H. Kurz*, 16 Jan. 1953 (FC, T), *G. Grice*, 10 Oct. 1953 (FC, T).

ALABAMA: on pilings in Mobile Bay, Point Clear, Baldwin county, *Drouet & Louderback* 10162, 20 Dec. 1948 (FC). MISSISSIPPI: shore of Mississippi sound between Bay St. Louis and Waveland, *Drouet* 9809, 9813, 9821a, 8 Dec. 1948 (FC); shore west of the lighthouse, Biloxi, *Drouet* 9951, 13 Dec. 1948 (FC); in Biloxi bay at Biloxi Oyster Laboratory, Biloxi, *Drouet & A. J. Bajkov* 10051, 10067a, 10068, 10074a, 10081, 10083, Dec. 1948 (FC); at the municipal docks, Ocean Springs, *Drouet & R. L. Caylor* 9898, 12 Dec. 1948 (FC); Pascagoula Beach, *Nielsen* 1390, 17 Jun. 1949 (FC, T). LOUISIANA: Calcasieu parish: in a cove in the southeast part of Lake Prien, *Drouet* 8777, 30 Oct. 1948 (FC); on the beach, north shore of Lake Charles, Lake Charles, *Drouet* 8766, 28 Oct. 1948 (FC). Cameron parish: in a pool beside Calcasieu river southwest of the school, Cameron, *Drouet* 8807, 2 Nov. 1948 (FC); Broussard's beach on the Gulf of Mexico east of Cameron, *Drouet* 8874, 3 Nov. 1948 (FC). Jefferson parish: in the bayou at Collins Camp west of Chenier Caminada, *Drouet & P. Viosca Jr.* 9460, 9462, 9463, 26 Nov. 1948 (FC); in Marais Cochin and the Gulf of Mexico southwest of Chenier Caminada, *Drouet & Viosca* 9480, 9484, 27 Nov. 1948 (FC). Lafourche parish: in the salt marshes between Leeville and Chenier Caminada, *Drouet & Viosca* 9450, 26 Nov. 1948 (FC). St. Tammany parish: on concrete-work, shore of Lake Pontchartrain, Mandeville, *Drouet & L. H. Flint* 9543, 2 Dec. 1948 (FC). Vermilion parish: in Vermilion river in the west part of Abbeville, *Drouet & R. P.*

Ehrhardt 9097, 13 Nov. 1948 (FC). TEXAS: Cameron county: on jetty, Brazos Santiago, R. Runyon 3949a, 7 Jun. 1945 (FC); in Laguna Madre at Point Isabel, Runyon 3924, 3964a, 3965, 3965d, 30 Jun. 1944, 17 Jul. 1945 (FC). Hidalgo county: La Sal del Rey, E. S. Deevey, 27 Nov. 1941 (FC). Willacy county: La Sal Viejo, Deevey, 29 Jan. 1941 (Type of *Pleurocapsa Deeveyi* Dr., FC). BRITISH COLUMBIA: Brandon Island, Departure bay, near Nanaimo, T. A. & A. Stephenson NB66, Summer 1947 (FC). WASHINGTON: Neah Bay, N. L. Gardner, May 1917 (FC, L), Gardner 3829a, Jun. 1917 (Type of *Placoma violacea* Setch. & Gardn., UC; isotype, D).

CALIFORNIA: Alameda county: on logs in salt water, Alameda, W. J. V. Osterhout & Gardner, 26 Sept. 1903 (as *Gloeocapsa crepidinum* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1151, FC, L, TA), Gardner 4119, Oct. 1917 (Type of *Pleurocapsa gloeocapsoides* Setch. & Gardn., UC; isotypes, FC, L, TA); in jar of salt water, physiological laboratory, University of California, Berkeley, Gardner 1702, May 1906 (FC, UC); on shells, Bay Farm island, Alameda, W. A. Setchell, 6 Oct. 1898 (as *Hyella caespitosa* in Coll., Hold., Setch., Phyc. Bor.-Amer. no. LI, FC, L, TA, WU), Setchell 2040—2043, 3—6 Oct. 1898 (FC, UC), Gardner 1195, Sept. 1903 (FC, L, TA, UC), Gardner 3683, 2 Mar. 1917 (FU, UC). Humboldt county: on piles, Humboldt bay, Eureka, Gardner 7843, 1 Jun. 1934 (FC, UC). Los Angeles county: San Pedro, Setchell, Dec. 1905 (FC, UC); in old salt water cultures, La Verne, G. J. Hollenberg 2179CD, 14 Dec. 1937 (Type of *Microcystis ovalis* Hollenb. and *M. splendens* Hollenb. in herb. G. J. Hollenberg; isotype, FC); Point Firmin, San Pedro, Gardner 1906, 17 Jan. 1908 (FC, UC); on municipal breakwater, Cabrillo beach, San Pedro, Hollenberg 1562a, 3 Oct. 1936 (Type of *Entophysalis marginalis* Hollenb. in herb. G. J. Hollenberg; isotypes, FC, D), Hollenberg 2379B, 22 Oct. 1938 (Type of *Myxobryella seriata* Hollenb. in herb. G. J. Hollenberg; isotype, FC); rocky shore at Long point, Santa Catalina island, E. Y. Dawson, 30 Nov. 1948 (FC). Marin county: on shells, Bolinas, Setchell & M. B. Nichols 6400a, 16—19 Nov. 1906 (FC, UC). Monterey county: on *Littorina planaxis*, Carmel, Gardner, Dec. 1915 (as *Hyella Littorinae* Setch. & Gardn. in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2255, FC, TA), Gardner 3108, Dec. 1916 (Type of *H. Littorinae* Setch. & Gardn., UC; isotype, FC, L, TA); on *Acinaea patina*, Carmel, Gardner 4531, Dec. 1919 (FC, UC); on rocks, Carmel bay, Setchell & R. E. Gibbs 3219, 12 Jan. 1899 (Type of *Pleurocapsa entophysaloides* Setch. & Gardn., UC; isotypes as *P. fuliginosa* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 704, FC, L, TA, UC, WU), C. P. B., 17 May 1897 (D, UC), Gardner 4527, Dec. 1919 (FC, UC); rocks near Pebble Beach, Carmel bay, Gardner 6405, Dec. 1927 (FC, UC); Mussel point, T. A. & A. Stephenson PGM100, Aug.—Nov. 1947 (FC); Point Labos, Stephenson PGL13, Aug.—Nov. 1947 (FC); dredged 0.5 mile east of Monterey, Hollenberg 3018, 11 Aug. 1939 (FC); Chataqua beach, Monterey, Setchell 1639, 15 May 1897 (FC, UC). San Mateo county: on *Littorina* sp., Moss Beach, Gardner 2101, Dec. 1909 (FC, UC). San Francisco: on piles, U. S. Life Saving Station, North beach, Setchell 1100, Dec. 1895 (UC); Lands End, Gardner 4392, 25 Jan. 1919 (FC, UC), Gardner 4480, Nov. 1919 (FC, TA, UC); Presidio, Gardner 4479, Nov. 1919 (FC, L, UC), Gardner 7033, 1 Oct. 1932 (FC, UC); Fort Point, Gardner 4894, Feb. 1924 (FC, TA), Gardner 6179, 6180, Apr. 1926 (FC, UC). Santa Barbara county: mouth of Cañada Lobos, Santa Rosa island, P. C. Silva 3937, 26 Jan. 1949 (FC, UC); Willows Anchorage, Santa Cruz island, Silva 6019, 11 Mar. 1950 (FC, UC). Sonoma county: Fort Ross, Setchell 714 (UC).

BAHAMA ISLANDS: on rocks, Atwood (Samana) cay, M. A. Howe 5282, 3 Dec. 1907 (Type of *Entophysalis violacea* Coll., NY; isotypes, D, UC); roof of cavern, Lignum Vitae cay, Berry islands, Howe 3654, 2 Feb. 1905 (FC, NY); rocks on ocean beach west of Lerner Laboratory, Bimini island, H. J. Humm 4, 15, Apr. 1948 (FC); border of a salt pond at eastern end of Mariguana, Howe 5538, 12 Dec. 1907 (Type of *Gloeocapsa bahamensis* Coll., NY; isotypes, FC, UC). BRITISH WEST INDIES: on pneumatophores of *Avicennia*, Cockburn Harbor, South Caicos, Howe 5583, Dec. 1907 (FH). PUERTO RICO: auf Kalksteinmauer beim Meere in Park, Santurce, N. Wille 35, 25 Dec 1914 (FC, UC); Sardinera, Mona island, C. A. Kaye, 1950 (D). GUADELOUPE: shore, Vieux Bourg, A. Quessel 255, 22 Feb. 1944 (FC, TA). JAMAICA: on walls of caverns below Fort Clarence, Kingston, Howe 4652, 4653, 21 Dec. 1906 (D, NY); on coral, Drunkenman's cay near Kingston, Howe 4734, 29 Dec. 1906 (D, NY); littoral cavern, Montego Bay, Howe 4898, 4899, 8 Jan. 1907 (D, NY); Beach Rock, Middle cay, Morant cays, V. J. Chapman 4, 4a, 1939 (FC). NETHERLANDS WEST INDIES: Bonaire & Klein Bonaire, P. Wagenaar Hummelinck, 1930 (L). MEXICO: Baja California: Ojito near Punta Maria, E. Y. Dawson & D. Fork 1595a, 14 Apr. 1946 (FC); reef at southern tip of Melpomene cove (South Anchorage), Guadalupe island, P. C. Silva, 1 Feb. 1950 (FC, UC); Cape San Lucas, Dawson 7255, 1 Apr. 1949 (FC); Guadalupe island, Dawson 8208, 17 Dec. 1949 (FC). Chiapas: in small marine estuary, Barra de Cahuacan, Dawson 3833, 16 Jan. 1947 (FC). Colima: on rocks, Clarion island, Sulphur bay, Revilla Gigedo islands, J. T. Howell 569a, 24 Mar. 1932 (Type of *Polycystis clarionensis* Setch. & Gardn., CAS), Howell 335 (FC, UC). Sonora: shore of island at entrance to harbor, Guaymas, F. Drouet & D. Richards 3085, 3085a,b, 2 Dec. 1939 (FC); shore of harbor near west end of the Paseo, Guaymas, Drouet & Richards 3119, 4 Dec. 1939 (FC); mangrove swamp at mouth of Rio de Sonora, Bahia Kino, Drouet & Richards 2897a, 9 Nov. 1939 (FC); rocks on south side of Isla Patos, Dawson 651, 17 Feb. 1946 (FC); rocks at Puerto Lobos, Bahia Tepoca,

Dawson 814, 19 Feb. 1946 (FC); tidal flats of Rio Mayo on north side of Yavaros, southwest of Huatabampo, Drouet & Richards 3194, 3216, 11 Dec. 1939 (FC). COSTA RICA: Braxillito bay, J. T. Howell 778e, 2 Jul. 1932 (FC, UC); on rocks and shells, Port Parker near Salinas bay, W. R. Taylor 39-81, 39-88, 24-25 Mar. 1939 (FC, MICH). PANAMA: rocky shore near the anchorage, Taboga island, Bahía de Panama, Taylor 39-622, 2 May 1939 (FC, MICH).

VENEZUELA: Golfo de Cariaco, herb. W. F. R. Suringar, (D, L). COLOMBIA: on rocks in the bay near Cartagena, F. A. Barkley 18B002c, 10 Jul. 1948 (FC). ECUADOR: on southeast side of Narborough island, Galapagos islands, J. T. Howell 576, 1 Jun. 1932 (Type of *Dermocarpa sphaerica* var. *galapagensis* Setch. & Gardner, CAS; isotypes, FC, UC); on rock, Osborne islet in Gardiner bay, Hood island, Galapagos islands, W. R. Taylor, 31 Jan. 1934 (D, TA); on lava in brackish lagoon, Punta Albemarle, Isla Isabela, Galapagos islands, Taylor 34-95, 12 Jan. 1934 (FC, MICH). PERU: Lima, A. Maldonado 11, Dec. 1940 (FC); in salt lakes, Huacho, prov. Chancai, Maldonado 80, 89, 94, 95a, Feb. 1942 (FC); Las Salinas, Lago Chilca, dept. Lima, Maldonado 62, 69, Jan. 1942 (FC). URUGUAY: La Paloma, dept. Rocha, W. G. Hertel 95007, Nov. 1934 (FC). HAWAIIAN ISLANDS: Kaneohe bay, Oahu, M. S. Doty 8823, 10695, 22 Apr. 1951, 9 May 1953 (FC); on breakwater, beach laboratory, University of Hawaii, Honolulu, Doty 995, 1952 (FC). CHRISTMAS ISLAND: lagoon bottom, Paris, F. R. Fosberg 13260a, 28 Aug. 1926 (FC). TUAMOTU ARCHIPELAGO: beach sand and rocks, Raroia atoll, Doty & J. Newhouse 11351, 11146, 11832, Jul.—Aug. 1952 (FC); cultures from beach rock and sand, Raroia, Doty & Newhouse 11286, 11303, 11445, 11671, 11876, 11877, 29 Sept. 1953 (FC). SOCIETY ISLANDS: on rocks near Huau, Tahiti, W. A. Setchell & H. E. Parks 5112, 5 Jun. 1922 (UC). WAKE ISLAND: J. Randall 53-83, 53-92, 53-95, 6 Jun. 1953 (FC). MARSHALL ISLANDS: lagoon reef and shore, Ine island, Arno atoll, L. Horwitz 9074, 9569, 9571, 15 Jul., 16 Aug. 1951 (FC); tidepools, Eniirikku island, Bikini atoll, W. R. Taylor 46-53, Mar. 1946 (FC, MICH); tidepools, Erik island, Bikini atoll, R. F. Palumbo Y8a, 1 Aug. 1949 (FC); pool back of beach rock, Giriinien island, Eniwetok atoll, Taylor 46-339, 28 May 1946 (FC, MICH); on rocks, Runit island, Eniwetok atoll, Palumbo 52-16, 22 Oct. 1952 (FC); on rocks, Kwajalein islet, Kwajalein atoll, G. J. Hollenberg 48C1, 2 Jul. 1948 (FC), F. R. Fosberg 34422, 15 Mar. 1952 (FC, US); coral boulder on lagoon beach, Sibylla islet, Pokak atoll, Fosberg 34501, 21 Jul. 1952 (FC, US); beach rock, Utirik islet, Utirik atoll, Fosberg 33718, 3 Dec. 1951 (FC, US); beach rock, Wocho and Enejeto islets, Wocho atoll, Fosberg 34423, 34425a, 18—19 Mar. 1952 (FC, US). PHOENIX ISLANDS: coral rock, Canton island, O. Degener 21344b, Apr. 1951 (FC).

NEW ZEALAND: vertical cliff face, Scott's Point, V. J. Chapman, 1949 (FC), V. W. Lindauer 2830, 26 Dec. 1942 (D); Bay of Islands, V. W. Lindauer 26, 20 Mar. 1938 (FC); shell-boring, Parua bay near Whangarei, W. A. Setchell 6158, 6160, 1904 (FC, UC); Oneroa, Bay of Islands, L. M. Jones, 18 Jan. 1935 (as *Entophysalis crustacea* in Tild., So. Pacific Pl., 2nd Ser., no. 374, FC); Tahapuke bay, Bay of Islands, A. & V. K. Nash, 15 Jan. 1935 (as *E. crustacea* in Tild., So. Pacific Pl., 2nd Ser., no. 347h, FC); rocks, Taharanui bay, North island, Lindauer 1996, 1997, 14 Dec. 1940 (FC); rocks below lighthouse, Half Moon bay, Stewart island, I. B. Warnock, 23 Feb. 1935 (as *E. crustacea* in Tild., So. Pacific Pl., 2nd Ser., no. 734, FC); Bounty islands, Chapman (FC); salt water, Bay of Islands, Lindauer 675, Jun. 1937 (UC); Long Beach, Bay of Islands, Lindauer A84, Feb. 1936 (UC). JAPAN: Tsuro, Cape Ashizuri, Kochi pref., I. Umezaki 1473, 19 Jun. 1954 (D). INDOCHINA: Bay Mien (Baichua), *Station Maritime de Cauda* 147, Jun. 1937 (L). INDONESIA: Dobo, Gisser, Kangean, Noesa-laut, Roma, Saleyer, Seget (New Guinea), Bima (Soembawa), Lamakwera (Solor), A. Weber-van Bosse, 1899—1900 (FC, L); Lamakwera, Solor, Weber-van Bosse (Types of *Entophysalis violacea* Weber-van Bosse and *Pleurocapsa magna* Weber-van Bosse, L); Noimini-bocht (Timor), Elat (Kei islands), Weber-van Bosse, 1899—1900 (L); Binnenmeer, Roesa Linguette island, van der Sande, 21 Jul. 1908 (FC, L); noorden van Kampong Gersik Poetik, Madoera, L. G. M. Baas Becking, Jul. 1936 (L); zuidkust Ost-Java bij Kampong Nglijip, P. Groenbart e, Oct. 1936 (L). AUSTRALIA: marine on rocks at Miami, Queensland, A. B. Cribb D, 4 Jan. 1949 (FC); Long Reef, Collaroy, New South Wales, C. M. Crosby & L. A. Doore, 2 Jan. 1935 (with *Rivularia atra* Roth in Tild., So. Pacific Pl. 2nd ser., no. 325, FC); in Lithophyllum, Pr. Puer, Port Arthur, Tasmania, Cribb 39.6, 8 Mar. 1950 (FC); on shells, Pelican island, Southport, Tasmania, Cribb 44.3, 21 Mar. 1950 (FC); Mangrove Point, Spencers Gulf, South Australia, H. B. S. Womersley A15046, 31 Dec. 1950 (FC). PALESTINE: plage, Jaffa, R. Joffé 152, Jan. 1897 (FC).

2. *ENTOPHYSALIS ENDOPHYTICA* Drouet & Daily, Lloydia 11: 79. 1948. *Chlorogloea endophytica* Howe, Mem. Torr. Bot. Club 15: 13. 1914. *Myxobyella Howe* Geitler, Beih. z. Bot. Centralbl., II, 41: 247. 1925. —Type from Bay of Secura, Peru (NY).

Chlorogloea lutea Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 434. 1918. *Myxobyella lutea* Geitler, Beih. z. Bot. Centralbl., II, 41: 247. 1925. —Type from Carmel bay, California (UC). FIG. 195.

Plantae endophyticae, microscopicae, olivaceae vel luteolae, cellulis solitariis sphaericis, diametro ad 2μ crassis; cellulis pulvini et filorum penetrantium praecipuis multiseriatis sphaeroideis vel polyhedroideis, diametro 1— 2μ crassis; endosporangiis quaerendis; gelatino vaginale hyalino, homogeneo; protoplasmate luteolo, luteo, vel olivaceo. FIG. 175.

In the superficial layers of various large marine algae (*Iridophycus*, *Zanardinula* spp., etc.). The penetrating filaments and small cushions are the usual growth-form seen in *Entophysalis endophytica*. Endosporangia have not been observed in the specimens available.

Specimens examined:

CALIFORNIA: on *Iridaea minor*, Carmel bay, Monterey county, N. L. Gardner 2981a, May 1915 (Type of *Chloroglea lutea* Setch. & Gardn., UC; isotype, FC [Fig. 195]); on *Iridaea laminarioides*, Pyramid point, Monterey county, W. A. Setchell 5464, 16 Jun. 1901 (FC, UC). PERU: in *Leptocladia peruviana*, Bay of Sechura, R. E. Coker 157, Apr. 1907 (Type of *Chloroglea endophytica* Howe, NY); in *Chondrus canaliculata* and *Gymnogongrus furcellata*, Chincha islands, Coker 192, 193, Jun. 1907 (NY); on Gigartina, Chincha Norte island, W. Vogt, 1941 (FC); on *Lessonia nigrescens*, Pescadores islands near Ancon, Coker 09150, Feb. 1907 (NY); on *Gymnogongrus furcellatus*, Callao, Coker 17, Dec. 1906 (NY). HAWAIIAN ISLANDS: on *Chnoospora fastigiata*, Makua, Oahu, M. Reed 197, 14 Apr. 1905 (FC, UC).

3. *ENTOPHYSALIS CONFERTA* Drouet & Daily, Lloydia 11: 79. 1948. *Palmella conferta* Kützinger, Phyc. Germ., p. 149. 1845. *Cagniardia conferta* Trevisan, Sagg. Monogr. Alg. Coccot., p. 50. 1848. *Pleurocapsa conferta* Setchell, Univ. Calif. Publ. Bot. 4: 229. 1912. *Chloroglea conferta* Setchell & Gardner, in Gardner, Univ. Calif. Publ. in Bot. 6: 432. 1918. *Microcystis conferta* Geitler ex J. de Toni, Diagn. Algar. Nov., I. Myxophyc. 2: 105. 1937. —Type from Cuxhaven, Germany (L). FIG. 211.

Hydrococcus marinus Grunow, Verh. K. K. Zool.-Bot. Ges. Wien 11: 420. 1861. *Oncobyrsa marina* Rabenhorst, Fl. Eur. Algar. 2: 68. 1865. *Placoma marina* Bornet & Thuret, Mém. Soc. Nat. Sci. Nat. Cherbourg 28: 179. 1892. —Type from Leucadia, Greece (W).

Sphaenosiphon cuspidatus Reinsch, Contrib. Algol. & Fungol. 1: 15. 1874. *Dermocarpa cuspidata* Geitler, Rabenh. Krypt.-Fl. 14: 391. 1932. —Type from the Adriatic sea (K).

Sphaenosiphon smaragdinus Reinsch, Contrib. Algol. & Fungol. 1: 16. 1874. *Dermocarpa smaragdina* Tilden, Minn. Alg. 1: 54. 1910. —Type from central Africa (K).

Sphaenosiphon prasinus Reinsch, Contrib. Algol. & Fungol. 1: 17. 1874. *Dermocarpa prasina* Bornet in Bornet & Thuret, Notes Algol. 2: 73. 1880. —Type from the Adriatic sea (K).

Sphaenosiphon olivaceus Reinsch, Contrib. Algol. & Fungol. 1: 17. 1874. *Dermocarpa olivacea* Tilden, Minn. Alg. 1: 55. 1910. —Type from Marseilles, France (K).

Sphaenosiphon incrustans Reinsch, Contrib. Algol. & Fungol. 1: 17. 1874. *Dermocarpa prasina* var. *incrustans* Holmes & Batters ex Forti, Syll. Myxophyc., p. 132. 1907. —Type from St. Lawrence river, Quebec (K).

Sphaenosiphon roseus Reinsch, Contrib. Algol. & Fungol. 1: 18. 1874. *Dermocarpa rosea* Batters, Hist. Berwickshire Nat. Club 12: 141. 1889. *Chamaesiphon roseus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 227. 1893. *Dermocarpa violacea* var. *rosea* Holmes & Batters ex Forti, Syll. Myxophyc., p. 130. 1907. —Type from central Africa (K).

Sphaenosiphon Leibleinia Reinsch, Contrib. Algol. & Fungol. 1: 103. 1874. *Dermocarpa Leibleinia* Bornet in Bornet & Thuret, Notes Algol. 2: 73. 1880. —Type from Atlantic North America (K).

Xenococcus Schousboei Thuret in Bornet & Thuret, Notes Algol. 2: 73, 75. 1880. *Coleonema arenifera* Schousboe pro synon. in Bornet & Thuret, ibid. p. 74. 1880. *Dermocarpa Schousboei* Bornet in Batters, Hist. Berwickshire Nat. Club 12: 11. 1889. —Type from Tangier (PC). FIG. 210.

Oncobyrsa adriatica Hauck, Meeresalg. Deutschl. & Oesterr., p. 515. 1885. —Type from Trieste (L). FIGS. 208, 209.

Chamaesiphon roseus var. *major* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 227. 1893. *Dermocarpa rosea* var. *major* Hansgirg ex Forti, Syll. Myxophyc., p. 130. 1907. —Type from St. Andrea, Trieste (W). FIG. 196.

Oncobyrsa adriatica var. *micrococca* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 228. 1893. —Type from Zengg, Croatia, Yugoslavia (W).

- Palmella tuberculosa* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 240. 1893. *Chlorogloea tuberculosa* Wille, Nyt Mag. Naturvid. 38(1): 5. 1900. —Type from Ragusa, Jugoslavia (W).
- Pleurocapsa amethystea* Rosenvinge, Meddel. om Grønl. 3: 967. 1893. *Chroococcopsis amethystea* Geitler, Beih. z. Bot. Centralbl. II, 41: 241. 1925. —Type from Fiskernaes, Greenland (C).
- Radaisia Gomontiana* Sauvageau, Journ. de Bot. 9: 374. 1895. —Type from Biarritz, France (PC).
- Dermocarpa biscayensis* Sauvageau, Journ. de Bot. 9: 403. 1895. —Type from Biarritz, France (PC).
- Dermocarpa strangulata* Sauvageau, Journ. de Bot. 9: 403. 1895. —Type from Biarritz, France (PC).
- Pringsheimia scutata* f. *Cladophorae* Tilden, Amer. Alg. 4: 382. 1900. *Xenococcus Cladophorae* Setchell & Gardner in Gardner, Univ. Calif. Publ. Bot. 6: 461. 1918. —Isotypes from Baird point, Vancouver island, British Columbia (D, FC).
- Dermocarpa fucicola* Saunders, Proc. Washington Acad. Sci. 3: 397. 1901. —Type from near Seattle, Washington (FH).
- Hyella endophytica* Børgesen, Bot. Faeroes 2: 525. 1903. *Myxobyella endophytica* Geitler, Beih. z. Bot. Centralbl., II, 41: 247. 1925. —Type from Thorshavn, Faeroes islands (in the collection of F. Børgesen).
- Dermocarpa Farlowii* Børgesen, Bot. Faeroes 2: 525. 1903. —Isotype from Suderø, Faeroes islands (UC).
- Pleurocapsa amethystea* var. *Schmidtii* Collins in Collins, Holden & Setchell, Phycotheca Boreali-Americana 35: 1704. 1911. —Type from Einarson, Iceland (C).
- Dermocarpa Vickersiae* Collins, Rhodora 13: 184. 1911. —Type from Valentia, Barbados (NY). FIG. 214.
- Dermocarpa solitaria* Collins & Hervey, Proc. Amer. Acad. Arts & Sci. 53: 17. 1917. —Type from Bermuda (NY). FIG. 197.
- Xenococcus Chaetomorphae* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 436. 1918. —Type from Cypress point, Monterey county, California (UC). FIG. 213.
- Dermocarpa hemisphaerica* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 438. 1918. —Type from Moss beach, San Mateo county, California (UC). FIG. 201 (paratype from Monterey county, California, FC).
- Dermocarpa pacifica* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 439. 1918. —Type from Cypress point, Monterey county, California (UC). FIG. 207.
- Dermocarpa suffulsa* Setchell & Gardner, Univ. Calif. Pub. Bot. 6: 440. 1918. —Type from Moss Beach, San Mateo county, California (UC).
- Dermocarpa sphaeroides* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 440. 1918. —Type from San Francisco, California (UC).
- Hyella linearis* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 442. 1918. *Myxobyella linearis* Geitler, Beih. z. Bot. Centralbl., II, 41: 247. 1925. —Type from Coos bay, Oregon (UC). FIG. 206.
- Hyella socialis* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 443. 1918. *Myxobyella socialis* Geitler, Beih. z. Bot. Centralbl., II, 41: 246. 1925. —Type from Carmel bay, California (UC).
- Radaisia Laminariae* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 444. 1918. *Nematoradaisia Laminariae* Geitler, Beih. z. Bot. Centralbl., II, 41: 242. 1925. —Type from San Francisco, California (UC). FIG. 204.
- Radaisia clavata* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 445. 1918. —Type from San Francisco, California (UC).
- Radaisia subimmersa* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 446. 1918. *Radaisiella subimmersa* Geitler, Beih. z. Bot. Centralbl., II, 41: 242. 1925. *Geitleriella subimmersa* J. de Toni, Noter. Nomencl. Algol. 8. 1930. —Type from Carmel bay, California (UC). FIG. 215.
- Radaisia epiphytica* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 447. 1918. —Type from Carmel Bay, California (UC). FIG. 205.
- Dermocarpa protea* Setchell & Gardner, Univ. Calif. Publ. Bot. 5: 456. 1918. —Type from Whidbey island, Washington (UC). FIG. 200.
- Dermocarpa sphaerica* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 457. 1918. —Type from San Pedro, California (UC).
- Xenococcus acervatus* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 459. 1918. —Type from Berkeley, California (UC). FIG. 212.
- Xenococcus Gilkeyae* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 462. 1918. —Type from Sitka, Alaska (UC).
- Xenococcus pyriformis* Setchell & Gardner, Univ. Calif. Publ. Bot. 6: 463. 1918. —Type from Coos bay, Oregon (UC).
- Chlorogloea regularis* Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 12: 698. 1924. —Type from Tortuga island, Baja California (CAS).

- Dermocarpa Reinschii* Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 12: 699. 1924.
 —Type from Tortuga island, Baja California (CAS).
Dermocarpa Marchantiae Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 12: 700. 1924.
 —Type from Santa Rosalia, Baja California (CAS).
Xenococcus deformans Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 12: 701. 1924. —Type from San Francisco bay, Baja California (CAS).
Pleurocapsa violacea Weber-van Bosse, Vidensk. Medd. Dansk Naturh. Foren. Kjøbenhavn 81: 61. 1926. —Type from Aroi islands, Indonesia (C).
Radaisia pusilla Weber-van Bosse, Vidensk. Medd. Dansk Naturh. Foren. Kjøbenhavn 81: 62. 1926. —Type from Kai islands, Indonesia (C).
Chamaesiphon clavatus Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 19: 118. 1930. —Type from Guadalupe island, Baja California (CAS).
Dermocarpa simulans Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 22: 66. 1937. —Type from North Seymour island, Galapagos islands (CAS).
Xenococcus angulatus Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 22: 67. 1937. —Type from Santa Maria bay, Baja California (CAS).
Xenococcus endophyticus Setchell & Gardner, Proc. Calif. Acad. Sci., ser. 4, 22: 67. 1937. —Type from Albermarle island, Galapagos islands (CAS).
Xenococcus violaceus Anand, Journ. of Bot. 1937 (Suppl. 2): 38. 1937. —Type from Westgate, England (in the collection of F. E. Fritsch). FIG. 199.
Dermocarpa Enteromorphae Anand, Journ. of Bot. 1937 (Suppl. 2): 42. 1937. —Type from Westgate, England (in the collection of F. E. Fritsch). FIG. 198.
Microcystis minuta Kylin, K. Fysiograf. Sällsk. i Lund Förh. 7(12): 22. 1937. —Paratype and topotype from Kristineberg, Sweden (D).
Dermocarpa suecica Kylin, K. Fysiograf. Sällsk. i Lund Förh. 7(12): 23. 1937. —Paratype and topotype from Kristineberg, Sweden (D).
Xenococcus pulcher Hollenberg, Bull. Torr. Bot. Club 66: 492. 1939. —Type from San Pedro, California (in the herbarium of G. J. Hollenberg). FIG. 202.
Dermocarpa sublittoralis Lindstedt, Fl. Mar. Cyanophyc. Schwed. Westküste, p. 30. 1943. —Isotype from Kristineberg, Sweden (D). FIG. 203.

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens are found:

- Chamaesiphon hemisphaericus* Lemmermann, Abh. Nat. Ver. Bremen 16: 353. 1900.
Dermocarpella hemisphaerica Lemmermann, Engler Bot. Jahrb. 38: 349. 1907. *Dermocarpa Lemmermannii* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, 1b: 106. 1942.
Dermocarpa Leibleiniae var. *pelagica* Wille in Hansen, Ergebn. Plankton-Exped. Humboldt-Stift. 4Mf., Schizophyc., p. 50. 1904.
Xenococcus laysanensis Lemmermann, Engler Bot. Jahrb. 34: 618. 1905.
Dermocarpella incrassata Lemmermann, Engler Bot. Jahrb. 38: 350. 1907. *Dermocarpa incrassata* Geitler, Beih. z. Bot. Centralbl., II, 41: 248. 1925.
Dermocarpa minima Geitler, Rabenh. Krypt.-Fl. 14: 392. 1932.
Microcystis minuta var. *aeruginosa* Lindstedt, Fl. Mar. Cyanophyc. Schwed. Westküste, p. 17. 1943.
Myxobryella Cavanillesiana Gonzalez Guerrero, Anal. Jard. Bot. Madrid 6: 247. 1946.
Dermocarpa Cavanillesiana Gonzalez Guerrero, Anal. Jard. Bot. Madrid 6: 249. 1946.

Plantae epi- vel endophyticae, microscopicae vel macroscopicae, primo unicellulares aetate provecta in stratum vel pulvinum olivaceum, aerugineum, violaceum, vel rubrum incrementis, cellulis solitariis sphaericis vel ovoideis vel pyriformibus, diametro ad 20μ crassis; cellulis strati vel pulvini sphaeroideis, post divisiones praecipue sphaericis vel polyhedroideis, diametro (1—)3— 6μ crassis; cellulis filorum penetrantium sphaericis, ovoideis, cylindraceis, vel polyhedroideis, diametro 3— 8μ crassis; endosporangiis sphaericis, obovoideis, cylindraceis, pyriformibus, vel tubaeformibus, diametro ad 50μ crassis, solitariis vel disciformiter aggregatis; protoplasmate aerugineo, olivaceo, violaceo, vel roseo, homoganeo vel tenuigranuloso. FIGS. 196—215.

Epiphytic and endophytic on larger algae of marine and brackish waters, the smaller growth-forms developing on ephemeral hosts, the more massive growth-

forms on perennial hosts. Unicellular and few-celled growth-forms of *Entophysis conferta* appear in a great variety of shapes on the larger annual algae of tide pools; many of the cells grow directly into endosporangia. Disc-like groups of new single-celled plants, often developing directly into endosporangia, grow from the released endospores. In some cases the endospores penetrate the outer layers of the cell walls of the host and grow there as endosporangia or as single—many-celled vegetative plants. On perennial algae, especially those subject to wave action, the penetrating filaments are often well developed. Large and bullose cushions are rarely found, since they develop on perennial algae in quiet waters.

Specimens examined:

NORWAY: paa *Fucus vesiculosus*, Biologisk Station, Dröbak, N. Wille, Apr. 1917 (S); in *Laminaria digitata* ad Dröbak, H. G. Simmons, Apr. 1898 (S). SWEDEN: in *Cladophora rupestris* epiphytica ad Väderö Storö in Bahusia, G. Lagerheim, Aug. 1882 (as *Dermocarpa violacea* in Wittr. & Nordst., Alg. Exs. no. 900, FC, L, NY, S, UC); on *Membranipora* on *Laminaria Cloustonii* and *L. saccharina*, Kristineberg, A. Lindstedt, 8 Jul. 1950 (paratypes and topotypes of *Microcystis minuta* Lylin and *Dermocarpa suecica* Lylin, D); culture from Kristineberg, A. Lindstedt, 1950 (isotype of *D. sublitoralis* Lindst., D [Fig. 203]). GERMANY: Helgoland, F. Hauck (L); auf *Callithamnion Rothii*, Cuxhaven, F. T. Kützling (Type of *Palmella conferta* Kütz., L [Fig. 211]). ADRIATIC SEA: in *Sphacelaria* in *Sargasso obtusato*, Adria, herb. P. Reinsch (K); in *Laurencia* in *Rhodophyc. major. cresc.*, herb. Reinsch (Type of *Sphaenosiphon prasinus* Reinsch, K); in *Sargasso obtusato*, herb. Reinsch (Type of *Sphaenosiphon cuspidatus* Reinsch, K). TRIESTE: F. Hauck, Oct. 1879 (Type of *Oncobyrsa adriatica* Hauck, L [Figs. 208, 209]); on *Lyngbya*, Hauck (L); in *Catenella Opuntia* (Gooden. & Woodw.) Grev., Hauck (as *Dermocarpa prasina* in Wittr. & Nordst., Alg. Exs. no. 693, FC, L, NY, S); *Servolia*, Hauck, Mar. 1883 (L); *Salinea*, Zaule, Hauck (L); on *Lyngbya luteo-fusca*, Umago, Hauck, 15 Jun. 1879 (D, FH); an *Enteromorpha fucicola* bei St. Andrea nächst Triest, A. Hansgirg (Type of *Chamaesiphon roseus* var. *major* Hansg., W; isotype, FC [Fig. 196]). JUGOSLAVIA: Istria: auf *Catenella Opuntia* bei Mostecnice, V. Nabelek, 26 Jul. 1914 (WU); Portolbona (Porto Rabaz), *Catenellae Opuntiae* insidens, J. Baumgartner (as *Dermocarpa prasina* in Mus. Vindob. Krypt. Exs. no. 3138, FC, L, NY, S, UC); prope Rovigno in *Catenella Opuntia*, J. N. F. Wille (as *Dermocarpa prasina* in Mus. Vindob. Krypt. Exs. no. 1518, FC, L, NY, S). Croatia: auf *Catenella Opuntia*, Insel Veglia bei der Stadt Veglia, M. Lusina, 28 Apr. 1915 (WU); an der Fluthgrenze bei Zengg, Hansgirg, 1891 (Type of *Oncobyrsa adriatica* var. *micrococca* Hansgirg, W; isotype, FC). Dalmatia: auf *Halimeda*, Spalato, Hauck (L); bei Ragusa, auf *Gelidium capillaceum*, Hansgirg, 1891 (Type of *Palmella suberulosa* Hansg., W; isotype, FC). GREECE: ad *Cladophora catenata* e portu Leucadiae, Mazzinari 1912 (Type of *Hydrococcus marinus* Grun., W).

MEDITERRANEAN SEA: in *Hypnea musciformis*, herb. P. Reinsch (K). ITALY: Porto Maurizio, Strafforello, Jun. 1874 (PC); Villa Rocco Romano, Posilippo, Napels, J. T. Koster 422, Apr. 1939 (L); Santa Lucia, Napels, Koster 420, May 1939 (L); Villa d'Ambra, Posilippo, Napels, Koster 423, Apr. 1939 (L); Palazza Donn'Anna, Posilippo, Napels, Koster 416, May 1939 (L). NETHERLANDS: Delfsijl, op *Rhodochorton Rothii*, Koster 1660, 5 Jun. 1950 (L), op *Elachista fucicola*, M. Weber 201, Jun. 1885 (L); op *Polysiphonia urceolata* en *Chateomorpha aerea*, Hoek van Holland, Koster 192, Feb. 1938 (L); op *Rhodochorton Rothii*, Condorpe bij Ellewoutsdijk, Westerschelde, C. Brakman 65, Feb. 1941 (L); on *Enteromorpha clathrata*, Koffiehoek, island of Tholen, C. den Hartog & A. F. Mulder, 27 Nov. 1951 (D, FC, L); op *Polysiphonia urceolata* etc., Oosterschelde, bij Katendijke, Zuid-Beveland, J. J. R. Walrecht, 10 Aug. 1951 (FC, L); on *Polysiphonia fastigiata* (Roth) Grev., harbor, Zoological Station, den Helder, Koster, 2 Dec. 1936 (D, FH, L). FAEROES ISLANDS: on *Rhodochorton Rothii*, Højrj, Strømø, F. Børgeesen 202, 24 Jun. 1895 (K); Transgaaafjorder, Suderø, Børgeesen 546, May 1896 (FH, UC); Krivig, Strømø, Børgeesen 757, 31 May 1896 (C, D, DT); in *Polysiphonia fastigiata*, Tveraa, Suderø, Børgeesen 536, May 1896 (isotype of *Dermocarpa Farlowii* Børgeesen, UC); in *Laminaria hyperborea* (Gunn.) Fosl., Thorshavn, Strømø, H. Jonsson, 20 Nov. 1897 (Type of *Hyella endophytica* Børgeesen, slide in the collection of F. Børgeesen; isotype, C). GREAT BRITAIN: Scotland: op *Ectocarpus* sp., haven van Leith, J. T. Koster 129, Aug. 1936 (L). England: on *Catenella Opuntia*, seaside rocks, Devonshire (in M. Wyatt, *Algae Danmonienses* no. 126, FC); on *Polysiphonia fastigiata* on *Fucus nodosus*, Devonshire (in Wyatt, *Algae Danmonienses* no. 177, FC); Hastings, E. Batters, Apr. 1883 (L), Batters 64, 1886 (PC); Berwick-on-Tweed, Batters 92, 106 (PC), 129 (PC, UC), Feb. 1887, Jan. 1889; Sidmouth, G. W. T., Feb. 1886 (NY); Yarmouth, Batters 124, Jul. 1888 (PC); Muirhead, E. M. Holmes, Jan. 1887 (PC); on *Callithamnion Rothii* on buttresses of iron wall, Teignmouth, Holmes, 1 Jan. 1880 (PC); in *Catenella Opuntia*, Corvallis, herb. P. Reinsch (K); on *Enteromorpha*, chalk cliffs at Westgate, Anand, Oct. 1934 (Types of *Xenococcus violaceus* Anand and *Dermocarpa Enteromorphae* Anand in the collection of F. E. Fritsch; isotypes,

D [Figs. 198, 199]. IRELAND: on *Rhodochorton floridulum*, Clare island, A. D. Cotton, 1910—11 (NY).

FRANCE: sur *Lyngbya confervoides*, Banyuls-sur-Mer (Pyrenées Orientales), J. Feldmann 2659, Sept. 1932 (L, NY, S, TA); sur *Lyngbya*, Biarritz, E. Bornet, 8 Jun. 1870 (FC, FH, NY, PC, UC), 6 Aug. 1870 (PC); Biarritz, L. K. Rosenvinge 527b, Mar. 1885 (PC); sur *Fucus platycarpus* Thur., Port Vieux, Guéthary au Phare de Biarritz, Sauvageau, 20 Feb.—25 Mar. 1894 (Type of *Radaisia Gomontiana* Sauvag., PC; isotype, FC); sur *Sargassum rejete* au Port Vieux, Guéthary au Phare de Biarritz, Sauvageau, 20 Feb.—25 Mar. 1894 (Type of *Dermocarpa biscayensis* Sauvag. and *D. strangulata* Sauvag., PC); Cherbourg, sur *Catenella Opuntia*, Bornet, 11 Aug. 1874 (FC, FH, PC); Fouras (Charente Inférieure), L. Marchand, 15 Sept. 1879 (PC); Le Croisic, Bornet, Aug. 1873 (PC), Sept. 1873 (FH, L, NY, PC), Apr. 1877 (L), May 1877 (FC, L, NY, PC; as *Dermocarpa prasina* in Lloyd, Alg. de l'Ouest de la France no. 389, PC); in *Chorda filum*, Mare Mediteraneum, Marseille, herb. Reinsch (Type of *Sphaenosiphon olivaceus* Reinsch, K); St. Malo, le Grand Bey, Bornet, 4 Jul. 1872 (PC); ile Ste. Marguerite près Cannes, G. Thuret, 20 Apr. 1856 (PC). SPAIN: sur *Cystoseira ericoides* à Rivadeo, C. Sauvageau, Oct. 1895 (PC); La Corogne, Sauvageau, Oct.—Nov. 1895 (PC). TANGIER: Tingi, P. K. A. Schousboe, Dec. 1825 (Type of *Xenococcus Schousboei* Thur., PC; isotypes, FH, L [Fig. 210], UC). SIERRA LEONE: on *Lyngbya confervoides* Ag., Freetown and Kent, G. W. Lawson A622, A632, 4 & 7 Jul. 1953 (FC). GOLD COAST: on *L. confervoides* Ag., Axim, Lawson A472, 17 Dec. 1952 (FC); Dixcove, Lawson A292, 29 Dec. 1951 (D); marine, Christiansborg, Lawson A573, 27 Mar. 1953 (FC). CENTRAL AFRICA: in *Leibleinia capillacea* Kütz. in *Laurencia obtusa* Ag. crescente, herb. P. Reinsch (Type of *Sphaenosiphon smaragdinus* Reinsch, K); in *Gelidio corneo*, herb. P. Reinsch (Type of *Sphaenosiphon roseus* Reinsch, K). MOZAMBIQUE: auf Rhizoclonium in Quilmanefluss bei der Insel Pequene, Stuhlmann 83, Feb. 1889 (as *Xenococcus Kernerii* in Hauck & Richt., Phyk. Univ. no. 685, L). UNION OF SOUTH AFRICA: Cape of Good Hope: on *Dicryota*, Knysna, A. Weber-van Bosse, 1894 (L); on *Platysiphonia intermedia* (Grun.) Børges., Plettenberg bay, Weber-van Bosse 18, 1894 (FC, L); on *Lyngbya confervoides* Ag. on rocks, Muizenberg, W. A. Setchell, 19 May 1927 (FC, UC).

ICELAND: on *Rhodochorton Rothii*, Einarslon, H. Jonsson 728, 20 Jul. 1897 (Type of *Pleurocapsa amethystea* var. *Schmidtii* Coll., C). BERMUDA: on mangrove near Flats bridge, F. S. Collins 7262, May 1912 (NY); on *Bostrychia*, Gravelly bay, A. B. Hervey (UC); on *Spermothamnion gorgoneum* and *Ceramothamnion Codii*, Harrington sound, Hervey, Dec. 1914 (Type of *Dermocarpa solitaria* Coll. & Herv. in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2155, NY; isotypes, FC [Fig. 179], D, L, UC); on *Catenella Opuntia*, Hungry bay, Hervey 27, Feb. 1909 (UC), Collins 7202, May 1912 (UC), Collins, 2 May 1913 (as *Dermocarpa prasina* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2051, FC, L, NY); epiphyte, Red Hole, eastern St. Davids island, W. R. Taylor 49-1888, 27 May 1949 (FC, MICH); Shelly beach, Collins, Aug. 1912 (FH); on *Lyngbya confervoides* in ditch back of Shelly bay, Collins, 15 Aug. 1913 (as *Xenococcus Schousboei* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2052, FC, L, NY, TA); on *Enteromorpha intestinalis* in ditch in South Shore meadows, Collins, 1 Sept. 1913 (as *Chroococcus membraninus* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2151, FC, D, L). CANARY ISLANDS: Puerto Orotava, C. Sauvageau, Jan. 1905 (PC). FERNANDO DE NORONHA: on Rhizoclonium on rocks, L. G. Williams, Mar. 1945 (FC). FALKLAND ISLANDS: sur *Dumontia fastigiata* (in Hohenacker, Alg. Mar. no. 282, PC; in herb. Reinsch, K). GREENLAND: Fiskernaes, L. K. Rosenvinge, 31 May 1888 (Type of *Pleurocapsa amethystea* Rosenv., C). ATLANTIC NORTH AMERICA: in *Leibleinia* in Plocamio, herb. P. Reinsch (Type of *Sphaenosiphon Leibleinia* Reinsch, K). SAINT PIERRE & MIQUELON: on *Cladophora*, Pointe Blanche, P. Le Gallo 5, 30 Oct. 1945 (FC, TA). NOVA SCOTIA: Sydney, F. S. Collins, Sept. 1899 (NY, UC); on *Cladophora* in tidepool, Prospect, R. A. Lewin, 1 Oct. 1952 (FC). MAINE: on *Polysiphonia fastigiata*, Pond Cove, W. R. Taylor, Feb. 1928 (TA); Inner Marsh island, Casco bay, Collins, Aug. 1903 (NY, UC); on *Rhodochorton Rothii*, Eagle island, Collins 2113, Jul. 1891 (NY), Collins 2702, Jul. 1893 (NY); Casco bay, Collins, Aug. 1903 (NY); Long island, Casco bay, Collins, Sept. 1902 (NY); Northport, Collins 1012, Aug. 1887 (NY); Cutler, Collins, Jul. 1902 (NY); Buck island, Collins 2942, Jul. 1894 (NY); Harpswell, Collins 4805, 13 Jul. 1903 (FH, NY), Collins 5080, Jul. 1904 (NY); Seal Harbor, Collins, Jul. 1899 (NY); on *Polysiphonia fastigiata*, Seguin island, M. A. Howe 1125, Aug.—Sept. 1900 (FH, NY); Pemaquid Point, H. B. Loudereback & C. Graham, 5 July 1949 (D, FC). NEW HAMPSHIRE: Apledore, Isles of Shoals, W. G. Farlow, Sept. 1900 (FH); Newcastle, Collins 3727, May 1900 (NY).

MASSACHUSETTS: on *Polysiphonia fastigiata*, Clifton, Collins & W. A. Setchell, 20 Apr. 1889 (FC, NY, TA, UC); on *Cladophora* in upper tide pool, rocky shore, Cohasset, Collins, 12 Oct. 1901 (as *Xenococcus Kernerii* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 952, FC, L, UC); on *Polysiphonia fastigiata*, Little Nahant, W. A. Setchell 319, 18 Apr. 1891 (FC, UC; as *Dermocarpa prasina* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1, FC, L, NY, TA, UC); on *Rhodochorton Rothii*, Little Nahant, Setchell 292, Nov. 1890 (UC); on R. Rothii, Marblehead, Collins, 17 Jun. 1902 (FH), Aug. 1902 (NY, UC); on *Cladophora*, Magnolia, Farlow, Sept. 1903 (FC, FH); on *Polysiphonia fastigiata*, Nahant, Farlow (FH, PC), Collins, Apr. 1895 (as *Dermocarpa prasina* in Collins, N. Amer. Alg. no. 3, D, NY); on *Porphyra*, Nahant, Setchell, Jun. 1889 (UC); on *Rhizoclonium riparium*, Nahant, Collins, 17 Aug. 1889 (FC, FH, NY, UC); on *Rhodochorton*

Rotbii, Nahant, Collins 1518, 30 Mar. 1890 (FC, UC), L. N. Johnson 821, 7 May 1892 (FC); on *Polysiphonia fastigiata*, Swampscott, Collins 2032, Apr. 1891 (NY, UC); on *Chaetomorpha aerea*, Woods Hole, Setchell 815, 16 Aug. 1894 (FC, UC); on *Rhodochorton Rotbii*, Eel pond, Woods Hole, E. T. Rose, 16 Jul. 1936 (D); on *Lyngbya confervoides* Ag., steamboat wharf, Woods Hole, R. N. Webster & F. Drouet 2150, 7 Jul. 1938 (D). RHODE ISLAND: on *Lyngbya semiplena*, Newport, Collins 4221, Aug. 1901 (FH, NY, UC); on *Polysiphonia fastigiata*, Newport, H. M. Richards, Dec. 1890 (UC); on *Enteromorpha intestinalis*, Easton's point, Newport, Mrs. W. C. Simmons, Nov. 1896 (NY), Sept. 1898 (as *Dermocarpa violacea* in Coll., Hold., & Setch., Phyc. Bor. Amer. no. 556, FC, L, NY, TA, UC). CONNECTICUT: on *Rhodochorton Rotbii*, Seaside park, Bridgeport, I. Holden, 4 Jul. 1892 (FH), Holden 768, 11 Dec. 1892 (FH, NY); Black Rock, Bridgeport, Holden 667, 28 Jul. 1892 (FH); on *Cladophora*, Mill river, Fairfield, L. N. Johnson 194, 12 Sept. 1891 (FC); culture from Long Island sound, New Haven, R. A. Lewin C, 29 Feb. 1948 (FC). LABRADOR: in *Plocamio coccineo*, herb. Reinsch (K). QUEBEC: in *Polysiphonia fastigiata*, St. Lawrence river, herb. Reinsch (Type of *Sphaenosiphon incrustans* Reinsch, K). NEW YORK: on *Cladophora expansa* in tide pools, Cold Spring Harbor, Long island, Johnson 1055, 14 Aug. 1894 (FC). NEW JERSEY: on *Lyngbya*, Atlantic City, I. C. Martindale, 12 Dec. 1886 (FH, UC); on *Enteromorpha*, Atlantic City, J. N. Rose 19590, Aug. 1925 (NY). NORTH CAROLINA: on *Gelidium*, Beaufort, W. D. Hoys (NY); on *Lyngbya semiplena* on piling at west end of Shackleford Banks, Beaufort, H. J. Humm 12, 15 Sept. 1947 (FC); on *Calobrix prolifera* on wooden breakwater, Wrightsville Beach, Humm, 24 May 1946 (FC).

FLORIDA: on *Ceramium* washed up on the Atlantic ocean beach between Dania Beach and Hollywood Beach, Broward county, F. Drouet & H. B. Louderback 10327, 28 Dec. 1948 (FC); pilings 2 miles south of St. Johns river mouth, Jacksonville Beach, Humm 3, 19 Mar. 1948 (FC); on hydroid dredged 12 miles southeast of Alligator point, Franklin county, Humm, 27 Dec. 1952 (FC); Hendry creek about 10 miles south of Fort Myers, P. C. Standley 73256, Mar. 1940 (FC); on *Bostrychia* and *Cladophora*, Way key, Cedar keys, Drouet & C. S. Nielson 11127, 11181, 22 Jan. 1949 (FC, T); on *Padina*, moat, Garden key, Dry Tortugas, W. R. Taylor 422b, Jun. 1924 (NY, TA); on *Chaetomorpha*, Marineland, Humm, 19 Nov. 1950 (FC); on an ascidian on *Sargassum cymosum* dredged about 4 miles ESE of St. Marks Lighthouse, Wakulla county, Humm, 17 Aug. 1952 (FC). MISSISSIPPI: on *Bostrychia* on pilings, Gulf Coast Research Laboratory, Ocean Springs, Jackson county, Drouet & R. L. Caylor 9904, 12 Dec. 1948 (FC); on *Bostrychia*, Mississippi sound between Bay St. Louis and Waveland, Drouet 9807, 9811, 8 Dec. 1948 (FC); on *Bostrychia* in St. Louis bay, Bay St. Louis, Drouet 9853, 9 Dec. 1948 (FC). LOUISIANA: on *Lyngbya semiplena*, *L. confervoides*, and *Bostrychia* sp., Grand Isle, Jefferson parish, L. H. Flint, 2 Dec. 1945, 15 Aug. 1947, 13 Mar. 1953 (FC); on *Lyngbya semiplena* in Lake Pontchartrain at the south end of R. S. Maestri bridge, Orleans parish, Drouet & P. Viosca Jr. 9324, 24 Nov. 1948 (FC). TEXAS: on *L. confervoides* and *L. semiplena* on jetty, Brazos Santiago and South Padre island, Cameron county, R. Runyon 3950, 3972, 7 Jun., 18 Jul. 1945 (FC); on *Gracilaria foliifera* on jetty, Port Aransas, H. Hildebrand, 31 Dec. 1952 (FC). ALASKA: Sitka, N. L. Gardner 3962, Jul. 1917 (Type of *Xenococcus Gilkeyae* Setch. & Gardn., UC); on *Fucus*, Sitka, D. Saunders (UC). BRITISH COLUMBIA: on *Cladophora* in tide-pool, Baird point, strait of Juan de Fuca, J. E. Tilden, 3 Aug. 1898 (isotype of *Pringsheimia scutata* f. *Cladophorae* Tild. in Tild., Amer. Alg. no. 382, FC); on *Cladophora*, Nootka sound, Vancouver island, W. A. Setchell & H. E. Parks, 24 Jun. 1930 (FC, UC). WASHINGTON: on *Gigartina papillata*, Port Townsend, ex herb. Farlow (PC); on *Cladophora*, Port Townsend, Miss Cooley, Aug. 1891 (FH); on hairs of *Phoca* (the harbor seal), Puget sound, J. W. Slipp, Jul. 1942 (TA); on *Iridaea laminarioides*, Puget sound, herb. D. Saunders (FH); on *Fucus evanescens*, San Juan island, W. C. Muenscher 1389, Jun. 1915 (TA); on *Fucus*, Seattle, D. Saunders (UC); on *F. evanescens* f. *microcephalus* near Seattle, D. Saunders, Jun. 1899 (Type of *Dermocarpa fucicola* Saund. in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 801, FH; isotypes, FC, L, MICH, TA); Three Tree point, 15 miles south of Seattle, Gardner 7982, Jul. 1936 (FC, UC); on *Gelidium*, Channel rocks, West Seattle, Gardner 534 (FC, UC); on *Spongomorpha*, west coast of Whidbey island, Gardner 467, Jul. 1901 (Type of *Dermocarpa protea* Setch. & Gardn., UC; isotypes, FC [Fig. 200], FH, TA); on *Iridaea laminarioides*, Whidbey island, Setchell & Gardner 92a, 291 (UC); Whidbey island, Setchell & Gardner 301, 670 (UC). OREGON: on *Rhodochorton Rotbii*, North Bend, Coos county, Gardner 2756, May 1914 (Type of *Xenococcus pyriformis* Setch. & Gardn., UC; isotypes, FC, TA); on *Prionitis*, Sunset Beach near the mouth of Coos bay, Gardner 2769, May 1914 (Type of *Hyella linearis* Setch. & Gardn., UC; isotype, FC [Fig. 206]).

CALIFORNIA: on *Gigartina*, W. G. Farlow (FH); herb. D. Saunders (FH); N. L. Gardner 7315 (FC, UC). Alameda county: on *Enteromorpha* in pools in salt marsh near Berkeley, Gardner 1580, 15 Nov. 1905 (Type of *Xenococcus acervatus* Setch. & Gardn., UC; isotype, FC [Fig. 212], L. and as *Pleurocapsa amethystea* var. *Schmidtii* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1704, FC, L). Los Angeles county: on *Dichothrix*, Cabrillo Beach, San Pedro, G. J. Hollenberg 1574, 3 Oct. 1936 (FC, UC); on *Chaetomorpha* on piling, Cabrillo Beach, San Pedro, Hollenberg 2145, 30 Oct. 1937 (Type of *Xenococcus pulcher* Hollenb. in herb. G. J. Hollenberg;

isotypes, FC [Fig. 202], D); on Gigartina, Point Vicente, W. G. Farlow (FH); San Pedro, Gardner 1906, Jan. 1908 (Type of *Dermocarpa sphaerica* Setch. & Gardn., UC; isotype, TA); on Gelidium, Chaetomorpha, and Calothrix on breakwaters, San Pedro, Hollenberg 486, 1576, 1579, 2 Oct. 1934, 3 Oct. 1936 (D); on Gelidium, San Pedro, W. A. Setchell, Dec. 1895 (FC, UC); on *Hesperophycus Harveyanus*, Catalina harbor, Santa Catalina island, P. C. Silva 4649, 14 Feb. 1949 (FC, UC); Santa Catalina island, E. Y. Dawson 5490, 30 Oct. 1948 (FC). Marin county: on *Lyngbya confervoides*, Duxbury reef, Bolinas bay, Setchell 1038, Nov. 1895 (FC, UC); on Fucus, Bolinas, Gardner 4599, May 1920 (UC). Monterey county: on *Rhodochorton Rothii*, Setchell 5489, June 1901 (UC); on *Gelidium Coulteri*, Monterey, Mrs. A. E. Bush, Dec. 1885 (FH); on *Endocladia muricata* and *Iridaea laminariodes*, Pyramid point, Monterey, Setchell 5464, 5456, Jun. 1901 (UC); on *Iridophycus*, north end of beach, Carmel, Gardner 7783, 7783a, 18 Jul. 1935 (FC, UC); on *Calothrix crustacea*, Carmel bay, Setchell & R. E. Gibbs, 12 Jan. 1899 (as *Xenococcus Schousboei* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 554, FC, L, TA, UC); on *Iridaea*, Carmel bay, Gardner 2981, May 1915 (Type of *Hyella socialis* Setch. & Gardn., UC; isotype, FC); on *Rhodochorton Rothii*, Carmel bay, Gardner 2992, May 1915 (FC [Fig. 201], UC; as *Dermocarpa hemisphaerica* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2253, FC, L, MICH, TA); on *Rhodymenia*, Carmel bay, Gardner 3350a (Type of *Radaisia subimmersa* Setch. & Gardn., UC; isotype, FC [Fig. 215]); on *Iridaea minor*, Carmel bay, Gardner 3687, May 1916 (Type of *Radaisia epiphytica* Setch. & Gardn., UC [Fig. 205]; isotype, TA); on Gelidium, Point Carmel, Setchell, 3 Jun. 1901 (as *Dermocarpa fuciola* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1251, FC, D, L, MICH, TA); on *Gastroclonium ovale*, Point Carmel, Setchell 5448, Jun. 1901 (UC); Carmel point, I. F. Lewis, 8 Jul. 1929 (FC); on *Chaetomorpha aerea* near Cypress point, Gardner 3580, Jan. 1917 (Types of *Xenococcus Chaetomorphae* Setch. & Gardn. and *Dermocarpa pacifica* Setch. & Gardn., UC; isotypes, FC [Fig. 207, 213], L, TA, UC); Cypress point, Gardner 4528 (FC, L, TA, UC), 4543 (FC, L, TA, UC), 4656 (FC, UC), 4657 (FC, UC), 4694 (FC, UC), Dec. 1919, 1920; on *Rhodymenia californica*, Del Monte bay, R. A. Lewin, 19 Jul. 1948 (FC); on *Gelidium Coulteri* and *Gymnogongrus linearis*, Pacific Grove, Setchell 5409 (FC, UC), May, Jun. 1901; on *Fucus furcatus*, Pacific Grove, Gardner 4665, Dec. 1920 (FC, UC); on *Bornetia secundiflora* near Pacific Grove, J. M. Weeks 118a, Mar. 1897 (UC); on *Chaetomorpha aerea*, mouth of Carmel river, Pacific Grove, R. D. Wood, 2 Jul. 1946 (FC); on *Gelidium Coulteri*, Pebble beach, Carmel bay, Setchell 5482, 17 Jun. 1901 (FC, UC); on *Chondrus canaliculatus*, Pebble beach, Carmel bay, Gardner 7286, May 1933 (FC, UC); on *Rhodochorton Rothii* in a cave, Pebble beach, Pacific Grove, R. D. Wood, 29 Jun. 1946 (FC). Orange county: on *Lyngbya aestuarii* in brackish water west of Newport Beach, G. J. Hollenberg 1533, 1533c, 26 Sept. 1934 (FC, D); on Gelidium, Laguna Beach, Hollenberg 3094, 20 Mar. 1940 (FC). San Diego county: on Dictyota, San Diego, W. G. Farlow (FH); on *Calothrix scopulorum*, La Jolla, T. A. & A. Stephenson JBN41, 1947 (FC); on Laurencia, La Jolla, Hollenberg 2016, 26 Dec. 1936 (D). San Francisco: on *Laminaria Sinclairii*, Fort point, Setchell 2075, 16 Nov. 1898 (FC, UC), Gardner, 25 Dec. 1905, Dec. 1918 (as *Radaisia Laminariae* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 2254 a & b, FC [Fig. 204], TA), Gardner 3158 (FC, L, TA), 3159 (D, FC), 3675 (Type of *Radaisia Laminariae* Setch. & Gardn., UC); on *Gymnogongrus linearis*, Fort point, Setchell 6403, 30 Nov. 1906 (FC, UC); on *Iridaea laminarioides*, Fort point, Gardner 4482, Nov. 1919 (FC, UC); on Ulva, Lands End, Setchell & Gardner 1539, 28 May 1905 (FC, UC); on various algae, Lands End, Gardner 1538, Aug. 1903 (FC, UC), 3706a (Type of *Radaisia clavata* Setch. & Gardn., UC), 3710, Apr. 1917 (Type of *Dermocarpa sphaeroidea* Setch. & Gardn., UC), 4447, Apr. 1919 (FC, L, TA), 4780, 25 May 1922 (FC, UC), 4857, Oct. 1923 (FC, UC); on *Rhodochorton* in cave south of Point Lobos, I. F. Lewis, 22 Jul. 1929 (FC). San Luis Obispo county: on *Gymnogongrus linearis*, Bushnells beach, R. S. Reed, Jul. 1917 (UC); on *G. leptophyllus*, Cayucos, P. C. Silva 2299, 29 Nov. 1947 (FC, UC); on *Gelidium Coulteri*, Port San Luis, Silva 2476, 22 Feb. 1948 (FC, UC). San Mateo county: on *Rhodochorton Rothii*, Moss Beach, Gardner 2183, Apr. 1910 (Types of *Dermocarpa suffulta* Setch. & Gardn. and *D. hemisphaerica* Setch. & Gardn., UC; isotypes, FC, L, TA, UC), Gardner 6258, Apr. 1927 (FC, L, TA); Moss Beach, Gardner 4308, Jul. 1918 (FC, UC). Santa Barbara county: on *Gigartina Harveyana*, Point Arguello coast guard station, P. C. Silva 2549, 28 Dec. 1947 (FC, UC); on *Rhodochorton Rothii* in cave, Lady's harbor, Santa Cruz island, Hollenberg 1311, 19 Apr. 1936 (D); on *Corallina gracilis*, Forneys cove, Santa Cruz island, Silva 5925, 8 Mar. 1950 (FC, UC); on *Corallina*, Chaetomorpha, and Chondria, Santa Rosa island, Silva 4069, 4079, 4142, 27 Jan. 1949 (FC, UC). Sonoma county: on *Laurencia pinnatifida*, Fort Ross, Setchell 1717, Dec. 1897 (FC, UC).

BAHAMA ISLANDS: on Catenella, Little Harbor cay, Berry islands, M. A. Howe 3592b, 31 Jan. 1905 (D, NY). PUERTO RICO: on *Cladophoropsis membranacea*, Point Borinquen near Aguadilla, Howe 2459b, Jun. 1903 (NY); on *Lyngbya semiplena* on cement, Santurce beach, H. L. Blomquist 12785, 25 Feb. 1942 (FC); on *L. sordida*, Gaujatacca, Blomquist 12923, 21 Mar. 1942 (FC); on *Calothrix pilosa*, west side of Guanica bay, Blomquist 13013, 21 Mar. 1942 (FC); on *Rhizoclonium* on mudflat, Las Marias, Blomquist 13099a, 21 Mar. 1942 (FC). VIRGIN ISLANDS: Lt. Princess, St. Croix, F. Børgesen 15x, 1892 (UC). BARBADOS: on *Dictyopteris delicatula*,

Valentia, *A. Vickers*, 17 Jan. 1899 (FC, UC), Jun. 1899 (Type of *Dermocarpa Vickersiae* Coll., NY; isotypes in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1602, FC [Fig. 214], FH, L, TA). JAMAICA: Northeast cay, Morant cays, *C. B. Lewis* A1172, Jun. 1950 (FC). MEXICO: Baja California: on *Gracilaria Cunninghamii*, Cabo Colnett, *E. Y. Dawson* 5241, 4 Sept. 1948 (FC); on *Lyngbya semiplena* on pilings, southeast side of Cerros island, *W. R. Taylor* 39-2, 14 Mar. 1939 (FC, MICH); Ensenada, *N. L. Gardner* 4994f (FC, UC); Guadalupe island, *H. L. Mason* 63 (Type of *Chamaesiphon clavatus* Setch. & Gardn., CAS; isotype, UC); Punta Baja near Rosario, *Dawson* 1196, 1199, 1200, 9 Apr. 1946 (FC); San Bartolome bay, *J. T. Howell* 759, 14 Aug. 1932 (FC, UC); San Francisco bay, *I. M. Johnston* 13a (Type of *Xenococcus deformans* Setch. & Gardn., CAS; isotype, UC); in *Callymenia angustata*, Santa Maria bay, *Howell* 739a, 12 Aug. 1932 (Type of *Xenococcus angulatus* Setch. & Gardn., CAS); Santa Rosalia, *Marchant* 108 (Type of *Dermocarpa Marchantiae* Setch. & Gardn., UC); on *Hesperophycus Harveyanus*, South island, Isla de Todos Santos, *P. C. Silva* 4833, 24 Feb. 1949 (FC, UC); Tortuga island, Gulf of California, *Johnston* 34c (Type of *Dermocarpa Reinschii* Setch. & Gardn., CAS), *Johnston* 133a (Type of *Chlorogloea regularis* Setch. & Gardn., CAS). Guerrero: on *Sertularia*, Acapulco, *Dawson* 3853, 3 Feb. 1947 (FC). Jalisco: on *Lyngbya confervoides*, Barra Navidad, *Dawson* 3745, 25 Dec. 1946 (FC). Oaxaca: on *Chaetomorpha*, Salina Cruz, *Dawson* 3784, 9 Jan. 1947 (FC). Sonora: shore of island at entrance of harbor, Guaymas, *F. Drouet* & *D. Richards* 3352, 21 Dec. 1939 (FC); on *Lyngbya confervoides*, Playa Miramar, Guaymas, *Drouet* & *Richards* 3139, 5 Dec. 1939 (FC); in tide-pool, Punta San Pedro, Guaymas, *Drouet* & *Richards* 3382, 22 Dec. 1939 (FC); on *Chaetomorpha*, Isla Patos, *Dawson* 652, 17 Feb. 1946 (FC).

GUATEMALA: on *Chaetomorpha*, Bay of Santo Tomás between Escobas and Santo Tomás, dept. Izabal, *J. A. Steyermark* 39340, 13 Apr. 1940 (FC). PANAMA: on *Lyngbya sordida* in tide-pools, Islas Secas near Puerto Nuevo, *W. R. Taylor* 39-123, 26 Mar. 1939 (FC). BRAZIL: Paraná: on *Lyngbya confervoides*, Ilha de Farol, Caiobá, *A. Brandão* Joly 490, 8 Feb. 1951 (FC); on *Cladophora*, Caiobá, *Brandão* Joly 492, 528, 9 Feb. 1951 (FC); on *Gelidiella*, Praia Medanha, *Brandão* Joly 513, 11 Feb. 1951 (FC); on *Lyngbya confervoides* and *Pylaiella*, Punta das Caieiras, *Brandão* Joly 518, 519, 525, 12 Feb. 1951 (FC). São Paulo: São Vicente near Santos, *F. Rauwischer* 43, 1941 (FC, TA); on *Cladophora*, Guarujá (Santos), *A. Padala* 331, 20 Oct. 1950 (FC). Praia de Parnapoan, S. Vicente, *Joly* 150, 7 Oct. 1953 (D); on *Lyngbya confervoides*, Peruibe, *Brandão* Joly 399, 459, 29 Dec. 1950, 1 Jan. 1951 (FC). URUGUAY: on *L. confervoides*, Punta del Este, Maldonado, *D. Legrand* 2, Mar. 1945 (FC, TA). ECUADOR: Galapagos islands: among *Rhizoclonium robustum*, North Seymour island, *J. T. Howell* 170b, 11 Jun. 1932 (Type of *Dermocarpa simulans* Setch. & Gardn., CAS; isotypes, D, UC); on *Rhizoclonium riparium* in a tide-pool 5 miles northeast of Webb cove, Albemarle island, *Howell* 429b, 22 May 1922 (Type of *Xenococcus endophysicus* Setch. & Gardn., CAS; isotypes, D, UC); on *Gelidium* and mangrove, southeast side of Narborough island, *Howell* 344, 587, 1 & 2 June 1932 (FC, UC); tide-pool, Villemil, Albemarle island, *Howell* 418, 27 Apr. 1932 (FC, UC). PERU: on *Streblodladia spicata*, Pisco, *R. E. Coker* 465, Jul. 1908 (NY); Chinchá Norte island, *W. Vogt*, 1941 (FC); Lima, *A. Maldonado* 13, Dec. 1930 (FC); on *Rhizoclonium*, Lago Chilca and Laguna Saraja, Maldonado 65, 93, Jan.—Feb. 1942 (FC). HAWAIIAN ISLANDS: Waikiki near Honolulu, *W. A. Setchell* 5595, Jul. 1900 (FC, UC). PHOENIX ISLANDS: on *Lyngbya confervoides*, southeast side of Canton island, *O. Degener* 21343, Apr. 1951 (FC). GUAM: on the reef at the mouth of Pago river, eastern coast, *A. E. Vatter Jr.* 4, 25 Jan. 1946 (FC). NEW ZEALAND: on *Cladophora* on floor of cave, Island, Half Moon bay, Stewart island, *I. B. Warnock* 700A, 19 Feb. 1935 (in Tild., So. Pacific Pl., 2nd ser. no. 700A, FC); New Zealand, on *Rhizoclonium*, *V. J. Chapman*, Dec. 1948 (FC); on *Enteromorpha*, Auckland, *Chapman*, Jun. 1946 (FC); Bay of Islands, *Chapman* 9060b, 1947 (FC); on *Rhodochorton*, Long Beach, Bay of Islands, *V. W. Lindauer* 1725, 26 Jan. 1940 (FC, UC).

JAPAN: on *Chordaria simplex*, Tokyo, Yataba, Feb. 1878 (FH, FC); on *Myelophycus caespitosus*, Japan, *K. Yendo*, Dec. 1898 (D, FC, UC); Shimoda, *Yendo*, Feb. 1907 (D, FC, UC); in *Gymnogongrus* sp., Aburataubo, and in *Carpopeltis* sp., Jyoga-shima, Miura peninsula, Misaki, *I. Umezaki* 985, 987, 29, 30 Mar. 1953 (D). PHILIPPINES: on *Lyngbya aestuarii* in fishponds, Manila, *E. D. Merrill* 7458 (D, FC, UC), Aligaen near Manila, *G. T. Velasquez* 144, Dec. 1953 (D); on *Chaetomorpha brachygona* in fishponds at Dagat-Dagatan, Rizal, *Velasquez* 624, 19 Jan. 1941 (FC); on *Lyngbya aestuarii*, Parañaque, Rizal, *M. T. Cruz* 19555, Aug. 1933 (FC, UC). VIET NAM: on *Lyngbya confervoides* on jetty, Cauda, Bay of Nhatrang, *E. Y. Dawson* 11300, 10 Feb. 1953 (FC). INDONESIA: by *Bostrychia tenella*, Aroi Eilanden [Manumbai], *H. Jewell* 234, 1914—16 (Type of *Pleurocapsa violacea* Weber-van Bosse, C); on *Lyngbya confervoides*, Endek, Flores, *A. Weber-van Bosse* 1124, Dec. 1888 (L); Banda, Kai islands, on *Cladophora*, *T. Mortensen* VIII, 10 Jun. 1922 (Type of *Radaisia pusilla* Weber-van Bosse, C); drijvende op rif, Sanana, Soela Besi, *Weber-van Bosse*, Sept. 1899 (L); strand, Adja-Toening, Nieuw Guinea, *Weber-van Bosse*, 1899—1900 (L). AUSTRALIA: on *Calothrix pilosa*, Brampton island off Mackay, Queensland, *V. May* 2701, 16 Jun. 1948 (FC); in mari, Sydney, New South Wales, *A. Grunow* 022, Aug. 1884 (PC); on *Lyngbya confervoides* in rock pools, Wattamolla, New South Wales, *May* 214, 26 Aug. 1944 (D, FC); auf *Sphacelaria furcigera* auf *Sargassum Peronii*, Nordwest-Australien, *Gazellen-Expedition* B312-

(137)*a*, 26 Apr. 1875 (B); on *Calothrix crustacea*, Emu bay, Kangaroo island, South Australia, H. B. S. Womersley *O*, 10 Jan. 1946 (FC). ISRAEL: on *Lyngbya confervoides*, Tel Aviv, T. Rays *s*, Dec. 1943 (FC). MAURITIUS: on *L. confervoides*, Flacq, Baie de 4 Cocos, N. Pike, 23 Jan. 1870 (FC).

4. ENTOPHYSALIS RIVULARIS (Kütz.) Dr.

Plantae primum microscopicae aetate provecta in stratum aut pulvinum macroscopicum aerugineum, olivaceum, brunneum, violaceum, rubrum, vel nigrum increscentes, cellulis solitariis et ad basem strati aut pulvini sphaericis, ellipsoideis, obovoideis, vel cylindraceis, diametro 2—8 μ crassis; cellulis superioribus praecipue sphaeroideis vel post divisiones polyhedroideis; cellulis filorum intus substratum penetrantium ovoideis, sphaericis, cylindraceis, vel polyhedroideis, diametro (1—)2—15 μ crassis; endosporangiis sphaericis vel ovoideis, diametro ad 30 μ crassis; gelatino vaginale primum hyalino demum lutescente vel raro rubrescente seu coerulescente, homoganeo vel lamellosa; protoplasmate aerugineo, olivaceo, luteolo, violaceo, vel roseo, homoganeo vel sparse grossi-granuloso. FIGS. 216—220, 222—234, 374, 375.

Strata and cushions are the most familiar growth-forms of *Entophysalis rivularis*. On limestone and shells, the basal penetrating filaments develop copiously; but they are absent or represented only by elongated and curved cells on non-calcareous rocks and on wood.

Key to forms of *Entophysalis rivularis*:

- Solitary and basal cells ovoid or spherical f. RIVULARIS
Solitary and basal cells cylindrical f. PAPILLOSA

4a. ENTOPHYSALIS RIVULARIS f. RIVULARIS. *E. rivularis* Drouet, Amer. Midl. Nat. 30: 671. 1943. *Hydrococcus rivularis* Kützing, Linnaea 8: 380. 1833. *Oncobyrsa rivularis* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Math.): 47, 96. 1843. —Type from Schleusingen, Germany (L). FIG. 217.

Pleurococcus julianus Menegh., Giorn. Toscano Sci., Med., Fis. e Nat. 1: 186. 1840. *Protococcus julianus* Kützing, Sp. Algar., p. 198. 1849. *Chroococcus julianus* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. *Gloeocapsa juliana* Kützing ex Rabenhorst, Fl. Eur. Algar. 2: 42. 1865. *Bichatia juliana* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from the Julian springs, Italy (FI). FIG. 225.

Pleurococcus glomeratus Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 40. 1843. *Chroococcus glomeratus* Forti, Syll. Myxophyc., p. 20. 1907. —Type from the Italian Tyrol (FI). FIG. 234.

Palmella duriuscula Kützing, Phyc. Gener., p. 172. 1843. *Cagniardia duriuscula* Trevisan, Sagg. Monogr. Alg. Coccot., p. 50. 1948. —Type from Schleusingen, Germany (L). FIG. 220.

Hydrococcus ulvaceus Kützing, Phyc. Gener., p. 177. 1843. *Oncobyrsa ulvacea* Rabenhorst, Fl. Eur. Alg. 2: 67. 1865. *O. rivularis* var. *ulvacea* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 93. 1891. —Type from Monfalcone, Italy (L). FIG. 223.

Protococcus carneus Kützing, Phyc. Germ., p. 146. 1845. —Type from Silesia (L). *Palmella Brebissonii* Kützing, Tab. Phyc. 1: 24. 1846. —Type from Falaise, France (L).

Exococcus ovatus Nägeli, Die Neuern Algensyst., p. 170. 1847. —Type from Zürich, Switzerland (ZT).

Gloeocapsa dermochroa Nägeli in Kützing, Sp. Algar., p. 224. 1849; Nägeli, Gatt. Einzell. Alg., p. 51. 1849. *Bichatia dermochroa* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Pleurococcus dermochrous* Nägeli *pro* synonym. ex Wille, Nyt Mag. Naturvid. 62: 186. 1925. —Type from Zürich, Switzerland (L).

Gloeocapsa rubicunda Nägeli, Die Stärkekörner (Pflanzenphys. Unters. 2), p. 282. 1858. —Type from St. Moritz, Switzerland (ZT).

Polycystis fuscolutea Hansgirg, Oesterr. Bot. Zeitschr. 38: 87. 1888. *Microcystis fuscolutea*

- Forti, Syll. Myxophyc., p. 92, 1907. —Type from Modran, Bohemia (W).
- Chroococcus fuscoater* var. *fuscoviolaceus* Hansgirg, Oesterr. Bot. Zeitschr. 38: 115. 1888.
- C. fuscoviolaceus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(1): 20. 1890.
- Chamaesiphon fuscoviolaceus* Margalef, Collect. Bot. (Barcelona) 3(2): 221. 1952. —Type from Tannwald, Bohemia (W). FIG. 226.
- Cyamoderma rivulare* Hansgirg, Notarisia 4: 658. 1889. *Pleurocapsa rivularis* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 91. 1891. *Xenococcus rivularis* Geitler, Beih. z. Bot. Centralbl., II, 41: 245. 1925. —Type from Pocatek, Bohemia (W). FIG. 231.
- Chroococcus fuscoviolaceus* var. *cupreofuscus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(1): 20. 1890. *Pleurocapsa cuprea* Hansgirg, Prodr. Algenfl. Böhmen 2: 128. 1892. —Type from Tannwald, Bohemia (W). FIG. 216.
- Pleurocapsa minor* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 89. 1891. *Scopulonema minus* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, 1b: 93. 1942. —Type from Kuchelbad, Bohemia (W). FIG. 224.
- Pleurocapsa concharum* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 90. 1891. *Scopulonema concharum* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, 1b: 93. 1942. —Type from near Roztok, Bohemia (W).
- Aphanocapsa anodontae* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 99. 1891. *Microcystis anodontae* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 138. 1938. —Type from near Roztok, Bohemia (W).
- Chamaesiphon fuscus* var. *auratus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 538. 1891. —Type from Martinscica near Fiume, Yugoslavia (W).
- Aphanocapsa anodontae* var. *major* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 538. 1891. —Type from near Cilli, Slovenia, Yugoslavia (W). FIG. 219.
- Entophysalis Cornuana* Sauvageau, Bull. Soc. Bot. Fr., ser. 2, 14: cxvii. 1892. *Radaisia Cornuana* Sauvageau, Journ. de Bot. 9: 376. 1895. —Type from near Biskra, Algeria (PC). FIG. 218.
- Dermocarpa Flahaultii* Sauvageau, Bull. Soc. Bot. Fr., ser. 2, 14: cxix. 1892. —Type from near Biskra, Algeria (PC). FIG. 218.
- Hyella fontana* Huber & Jadin, Journ. de Bot. 6: 279. 1892. *H. fonticola* Huber & Jadin ex Forti, Syll. Myxophyc., p. 127. 1907. —Type from near Montpellier, France (PC).
- Chroococcus (Rhodococcus) Hansgirgii* Schmidle, Allgem. Bot. Zeitschr. 6: 79. 1900; Hedwigia 39: 189. 1900. —Type from Poona, India (ZT). FIG. 229.
- Coelosphaerium holopediforme* Schmidle, Beih. z. Bot. Centralbl. 10: 180. 1901. —Type from Schwenningen, Württemberg (ZT). FIG. 227.
- Placoma africana* Wille, Oesterr. Bot. Zeitschr. 53: 90. 1903. —Type from the Kachembe river, South Africa (O).
- Hyellococcus niger* Schmidle, Allgem. Bot. Zeitschr. 1905: 64. 1906. —Type from Mammern, Switzerland (ZT). FIG. 230.
- Guyotia singularis* Schmidle, Allgem. Bot. Zeitschr. 1905: 64. 1906. —Type from the Sinai peninsula, Egypt (ZT). FIG. 222.
- Palmophyllum foliaceum* G. S. West, Journ. Linn. Soc. Bot. 38: 145. 1907. —Type from Niamkolo, Tanganyika (BM).
- Pleurocapsa polonica* Raciborski, Phyc. Polon. 1: 11. 1910. *Siphononema polonicum* Geitler, Beih. z. Bot. Centralbl., II, 41: 251. 1925; Geitler, Arch. f. Protistenk. 51: 332. 1925. *Scopulonema polonicum* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, 1b: 93. 1942. —Type from Morskiem Okiem, Galicia, Poland (WU).
- Entophysalis samoensis* Wille, Hedwigia 53: 144. 1913; in Reehinger, Bot. & Zool. Ergebn. Samoa- & Salomoninseln, Süswasseralg., p. 7. 1914. —Type from Savaii, Samoa (O).
- Aphanocapsa constructrix* Brenekamp, Teymannia 25: 73. 1914. —Type from Idjen mountain in eastern Java, Indonesia (in the Mineralogisch-Geologisch Instituut, University of Utrecht).
- Chroococcopsis gigantea* Geitler, Arch. f. Protistenk. 51: 342. 1925; Beih. z. Bot. Centralbl., II, 41: 241. 1925; in Pascher, Süswasserfl. 12: 125. 1925. —Paratype named by the author, from Ranau lake, Sumatra (in the collection of L. Geitler).
- Chamaesiphon polymorphus* Geitler, Arch. f. Protistenk. 51: 327. 1925. —Paratype named by the author from Tjibodas, Java (in the collection of L. Geitler).
- Chroococcus minutissimus* Gardner, Mem. New York Bot. Gard. 7: 8. 1927. —Type from near Arecibo, Puerto Rico (NY). FIG. 232.
- Entophysalis chlorophora* Gardner, Mem. New York Bot. Gard. 7: 30. 1927. —Type from Coamo Springs, Puerto Rico (NY). FIG. 233.
- Radaisia Williei* Gardner, Mem. New York Bot. Gard. 7: 32. 1927. —Type from near Humacao, Puerto Rico (NY).
- Radaisia confluens* Gardner, Mem. New York Bot. Gard. 7: 32. 1927. —Type from Maricao, Puerto Rico (NY). FIG. 228.

Chamaesiphon ferrugineus Fritsch, New Phytol. 28: 178. 1929. —Type from Devonshire, England (in the collection of F. E. Fritsch).

Pseudonocybysa fluminensis Fritsch, New Phytol. 28: 181. 1929. —Type from Devonshire, England (in the collection of F. E. Fritsch). The young, largely unicellular, hormogonia of *Ampibiobrix janthina* (Mont.) Born. & Flah. make up a large part of this specimen; they account for at least part of the author's description.

Chroococcopsis fluminensis Fritsch, New Phytol. 28: 183. 1929. —Type from Devonshire, England (in the collection of F. E. Fritsch).

Chlorogloea purpurea var. *minutissima* Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 623. 1933. —Type from Ranu Pakis, east Java (in the collection of L. Geitler).

Chlorogloea major Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 623. 1933. *C. minor* Geitler, ibid., Suppl. XIV., 6: 386. 1935. —Type from Dijeng plateau, Java (in the collection of L. Geitler).

Myxosarcina spectabilis Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 624. 1933. —Type from Bukit Kili, Sumatra (in the collection of L. Geitler).

Chamaesiphon fallax Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 625. 1933. —Type from Pasergede, Java (in the collection of L. Geitler).

Radaisia gigas Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 626. 1932. —Type from Ranau lake, Sumatra (in the collection of L. Geitler).

Cyanodermatium gelatinosum Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 627. 1933. —Type from Ranau lake, Sumatra (in the collection of L. Geitler).

Cyanodermatium violaceum Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 627. 1933. —Type from Ranau lake, Sumatra (in the collection of L. Geitler).

Dermocarpa Gardneriana Drouet, Field Mus. Bot. Ser. 20: 128. 1942. —Type from San Francisco, California (FC).

Dermocarpa Setchellii Drouet, Field Mus. Bot. Ser. 20: 129. 1942. —Type from Harlem hot springs, San Bernardino county, California (FC).

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens are found:

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Palmella dura Wood, Smiths. Contrib. Knowl. 241: 80. 1872.

Chroococcus rubrapunctis Wolle, Bull. Torr. Bot. Club 6: 181. 1877.

Sphaerogonium subglobosum Rostafinski, Rozpr. Akad. Umiej. Krakow, Wydz. Mat.-Przyr., 10: 291. 1883. *Chamaesiphon subglobosus* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 98. 1907.

Sphaerogonium polonicum Rostafinski, Rozpr. Akad. Umiej. Krakow, Wydz. Mat.-Przyr., 10: 299. 1883. *Chamaesiphon polonicus* Hansgirg, Oesterr. Bot. Zeitschr. 37: 100. 1887.

Astenasya polymorpha Möbius, Ber. Deutsch. Bot. Ges. 5: 1xii. 1887. —See Möbius, ibid. 6: 358. 1888.

Hyella jurana Chodat, Bull. Herb. Boissier 6: 446. 1898. *H. fontana* var. *rubra* Nadson, Scripta Bot. Hort. Univ. Imp. Petropol. 18: 27. 1900.

Chroococcus Goetzei Schmidle, Engler Bot. Jahrb. 30: 242. 1901.

Coelosphaerium Goetzei Schmidle, Engler Bot. Jahrb. 30: 243. 1901.

Pleurocapsa salevensis Chodat, Étude sur de Polymorph. des Alg., p. 133. 1909.

Oncobyrsa sarcinoides Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 11. 1923.

Chroococcus sarcinoides Wislouch *pro synon.* in Elenkin, loc. cit. 1923; Wislouch, Acta Soc. Bot. Polon. 2: 110. 1924. *Chlorogloea sarcinoides* Troitzkaja, Dnevn. Vsesoiuzn. Sezda Bot., p. 162. 1928.

Oncobyrsa sarcinoides var. *sparsa* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 12. 1923.

Oncobyrsa sarcinoides var. *fulvo-cubica* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 12. 1923.

Oncobyrsa sarcinoides var. *irregulariter-consociata* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 12. 1923.

Oncobyrsa sarcinoides var. *irregulariter-consociata* f. *pallida* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 12. 1923.

Oncobyrsa sarcinoides var. *irregulariter-consociata* f. *fusca* Elenkin, Not. Syst. Inst. Crypt. Hort. Bot. Petropol. 2: 12. 1923.

Chroococcus lithophilus Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 75. 1925. *Gloeocapsa lithophila* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 207. 1938.

Chroococcus lithophilus f. *achromaticus* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 76. 1925.

Chroococcus lithophilus f. *coloratus* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 76. 1925.

Chroococcus schizodermaticus f. *pallidus* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 77. 1925.

Lithocapsa fasciculata Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 82. 1925.

- Lithococcus ramosus* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 83. 1925.
Pseudocapsa dubia Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 95. 1925.
Chlorogloea microcystoides Geitler, Arch. f. Protistenk. 51: 357. 1925.
Aphanocapsa endolithica Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 81. 1925.
Aphanocapsa endolithica var. *violaceus* Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 1: 82. 1925.
Aphanocapsa distans Zalessky, R v. G n. de Bot. 38: 35. 1926.
Hyella fontana var. *maxima* Geitler, Arch. f. Protistenk. 62: 100. 1928.
Aphanocapsa endolithica var. *rivulorum* Geitler, Arch. f. Protistenk. 60: 441. 1928.
Pleurocapsa cuprea f. *pirinica* Petkoff, Bull. Soc. Bot. Bulgarie 3: 37. 1929.
Chlorogloea microcystoides f. *pallida* Skuja, Acta Horti Bot. Univ. Latv. 4: 14. 1929.
Radaisia violacea Fr my, Arch. de Bot. Caen 3 (M m. 2): 56. 1930.
Pleurocapsa aurantiaca Geitler, Rabenh. Krypt.-Fl. 14: 354. 1931. *Scopulonema aurantiacum* Geitler in Engler & Prandl, Nat rl. Pflanzenfam., ed. 2, 1b: 93. 1942.
Myxosarcina spectabilis f. *regularis* Geitler ex J. de Toni, Diagn. Algar. Nov., I, Myxophyc. 9: 849. 1946.

Cellulae solitariae et ad basem strati aut pulvini sphaericae vel ovoideae. FIGS. 216—220, 222—234.

On rocks, shells, woodwork, backs of turtles, etc. in fresh water, mostly in clear streams, springs, fountains, and watering-tanks. The upper cells of the stratum or cushion, especially where the gelatinous matrix has hydrolyzed, often simulate those of *Anacystis montana*, *Coccochloris elabens*, certain small growth-forms of *C. stagnina*, and *Palmogloea protuberans* (Sm. & Sow.) K tz. The unicellular primordia of *Amphibrix janthina* (Mont.) Born. & Flah. have also been mistakenly identified with this form.

Specimens examined:

NORWAY: in rivulo frigido prope Gi vik in praefectione tromsoensi lapidibus affixum, G. Lagerheim, Sept. 1893 (as *Sphaerogonium fuscum* in Witt., Nordst., & Lagerh., Alg. Exs. no. 1611, FC, L, MIN, NY). POLAND: Galicia: na granitach w ycielajacych brzegi Czarnego stawu nad Morskiem Okiem, M. Raciborski, 5 Oct. 1909 (Type of *Pleurocapsa polonica* Racib. in Racib., Phyc. Polon. no. 11, WU; isotype, FH). Silesia: in einem Flasche Brunnenwasser, v. Flotow, 29 Feb. 1844 (Type of *Protococcus carneus* K tz., L). GERMANY: Saxony: an Pflanzenstengeln im Salzsee bei Halle, P. Richter (UC). Thuringia: an Br nnenufern, Schleusingen, F. T. K tzing (Type of *Palmella duriuscula* K tz., L [Fig. 220]; isotype, UC); in rivulo prope Hirschbach, Schleusingen, K tzing, 1830 (Type of *Hydrococcus rivularis* K tz., L [Fig. 217]; isotype, UC). W rttemberg: Neckar [-quelle bei Schwenningen], G. Schmidle, Aug. 1900 (Type of *Coelosphaerium holopediforme* Schmidle in the Schmidle collection, ZT [Fig. 227]). CZECHOSLOVAKIA: Moravia: Oslava, F. Nov cek, 29 Aug. 1933 (FC). Bohemia: Chotzen, A. Hansgirg, Jul. 1887 (FC, W); Desn  u Tannwald, Hansgirg, Jul. 1885 (FC, W); Dux, Hansgirg, Aug. 1883 (FC, W); Elbfall im Riesengebirge, Hansgirg, Sept. 1883 (FC, W); Hlubocepy, Hansgirg, Jun. 1885 (FC, W); in lapidibus calcareis viaductus magni ad Hlubocepy, Hansgirg (as *Gloeocapsa rupicola* in Kerner, Fl. Exs. Austro-Hung. no. 3199, Z); Johannsbad, Hansgirg, Jul. 1885 (FC, W); Karlovary, Stude , Hansgirg, Aug. 1883 (FC, W); ad rupes thermarum Carolinarum, Welwitsch (DT); Koda prope Karlstein, Sedlec prope Lodenice, Hansgirg, May 1890 (FC, W); in offenen Quellen an Steinen oberhalb Kuchelbad n chst Prag, Hansgirg, 3 May 1884 (Type of *Pleurocapsa minor* Hansg., W; isotype, FC [Fig. 224]); an von lauwarmen Wasser bespritzten Steinen und Eisenplatten in der Moldau bei der Zuckerraffinerie bei Modran n chst Prag, Hansgirg, Nov. 1887 (Type of *Polycystis fuscovirens* Hansg., W; isotype FC); Mummelfall bei Harrachsdorf, Hansgirg, Jul. 1886 (FC, W); Pantzschefall, Hansgirg, Sept. 1883 (FC, W); ad lapides in rivulo prope Pocatek, Hansgirg, Aug. 1888 (Type of *Cyanoderma rivulare* Hansg., W; isotype, FC [Fig. 231]); Praha, na stenach verej. vodovodu i v p issoirech, Hansgirg, Apr. 1883 (FC, W); Praha, stoky, Hansgirg, Feb. 1886 (FC, W); St. P ka, Hansgirg, Nov. 1883 (FC, W); Skt. Wenzens Brunnen, Prag, Hansgirg, Feb. 1884 (FC, W); Seegrund bei Eichwald, Hansgirg, Jul. 1883 (FC, W); Spindelm hle im Riesengebirge, Hansgirg, Nov. 1883 (FC, W); sk ly proti Srbsku u Karlsteina, Hansgirg, Jul. 1884 (FC, W); Str bro, Hansgirg, Aug. 1883 (FC, W); T bor, Hansgirg, Aug. 1883 (FC, W); in Bergbach an Steinen, Tannwald, Hansgirg, Jul. 1885 (Types of *Chronococcus fuscoater* var. *fuscovirens* Hansg. and *C. fuscovirens* var. *cupreofuscus* Hansg., W; isotypes, FC [Figs. 216, 226]); an alten Schalen von Anodonta, Tuchomerice—Ounetice n chst Rostok, Hansgirg, Jun. 1890 (Types of *Pleurocapsa concharum* Hansg. and *Aphanocapsa anodontiae* Hansg., W; isotypes, FC); V slau, Hansgirg, May 1887 (FC, W); Zel. Brod, Hansgirg, Jul. 1885 (FC, W).

AUSTRIA: Styria: in rivulo Gaiswinkelbach prope Grundlsee, K. & L. Reebinger, Sept. (as *Chamaesiphon polonicus* in Mus. Vindob. Krypt. Exs. no. 1760, FC, L, S, WU), L. & K. Reebinger 31, Sept. 1909 (FC, W); ad ostium lacus Leopoldsteiner See, K. de Keisler, Jul. (as *C. polonicus* in Mus. Vindob. Krypt. Exs. no. 1760b, FC, L, NY, S, WU). Tyrol: Hall, Innsbruck, and Jenbach, A. Hansgirt, 1891 (FC, W). JUGOSLAVIA: Slovenia: Podnat, Kaltenbrunn (prope Laibach), and Steinbrück, Hansgirt, Aug. 1890 (FC, W); an Schalen von Süßwasserschnecken bei Tremersfeld nächst Cilli, Hansgirt, Aug. 1890 (Type of *Aphanocapsa anodontae* var. *major* Hansg., W; isotype, FC [Fig. 219]). Istria: Pisino, Hansgirt, Aug. 1889 (FC, W); in aqua dulci, Parenzo, Hansgirt, Apr. 1889 (FC, W). Croatia: in aqua dulci, Fiume, Hansgirt, 1891 (FC, W); auf in schnell fließendem Wasser untergetauchten Steinen in Bächen bei Martinsica nächst Fiume, Hansgirt, 1891 (Type of *Chamaesiphon fuscus* var. *auratus* Hansg., W; isotype, FC). Dalmatia: ad cataractam fluminis Kerkae ad Scardonam, Hansgirt, Aug. 1888 (FC, W); Clissa prope Spalato, Hansgirt, Aug. 1889 (FC, W); Cannosa—Valdinocce prope Ragusa, Castelnuovo, Metkovic, Ombla prope Ragusa, Ragusa, & Topla—Gruda prope Castelnuovo, Hansgirt, 1891 (FC, W). ALBANIA: Karbounara presso Lushnjë (prov. Berat), corassa cornea di tartaruga palustre, presso la sorgente di HsS, G. de Toni 47, 30 May 1941 (D, DT, FC); Fushes-Dukati (prov. Valona), m. Shendellit, velo d'acqua nella sorgente, in cavità naturale, G. de Toni & L. Boldori 81, 6 Jul. 1941 (D, DT, FC). SWITZERLAND: St. Moritz, an einem hölzernen Trog, C. von Nägeli, Jul. 1849 (Type of *Gloeocapsa rubicunda* Näg., with *Leptothrix muralis*, ZT); Zürich, Pfiffens in einer Brunnen, Nägeli, Sept. 1845 (Type of *Exococcus ovatus* Näg., ZT); Zürich, [Küsnacht], Nägeli 107, Jul. 1847 (Type of *Gloeocapsa dermochroa* Näg. in herb. Kützing, L; isotypes, FI, M, UC); auf Steinen am Bodenseefer bei Mammern, G. Schmidle, Mar. 1905 (Type of *Hyelococcus niger* Schmidle, ZT [Fig. 230]). ITALY: acqua santa near Rome (L); S. Margarita prope Ala, Auer, and Brixen, A. Hansgirt, 1891 (FC, W); fontana della piazza del Borghetti (Tirolo italiano), D. Clementi (Type of *Pleurococcus glomeratus* Menegh., FI [Fig. 234]); in fluvio Timavo prope Monfalcone, F. T. Kützing, Thomsini, & Bisoletto, 23 Apr. 1835 (Type of *Hydrococcus ulvaceus* Kütz., L [Fig. 223]); fons prope Monfalcone, Hansgirt, Aug. 1889 (FC, W); nel bagno freddo thermarum Julianarum, J. Corinaldi 33 (Type of *Pleurococcus julianus* Menegh., FI [Fig. 225]; isotypes, L, S, W).

NETHERLANDS: in kanaal achter de dijk ten Linden van Roptazijl, J. T. Koster 750, Aug. 1942 (L). ENGLAND: on stones in rather slow-flowing Badgeworthy Water, Devonshire, F. E. Fritsch, 3 Sept. 1918 (Type of *Chamaesiphon ferrugineus* Fritsch in the collection of F. E. Fritsch; isotype, D); on smooth rock-surfaces in the midst of the rushing torrent in the East Lyn, north Devonshire, Fritsch, 1 Sept. 1920 (Type of *Chroococcopsis fluminensis* Fritsch and *Pseudoncobyrza fluminensis* Fritsch in the collection of F. E. Fritsch; isotype, D). FRANCE: carrières, Falaise, A. de Brébisson 526 (Type of *Palmella Brebissonii* Kütz., L; isotype, UC); environs de Paris, M. Cornu, 1878 (D, FH); sources du Lez près Montpellier, F. Jadin, Jan. 1892 (Type of *Hyella fontana* Hub. & Jadin, PC), Jul. 1894 (FC); source de Font Méjane près Montarnaud (Hérault), J. Huber & F. Jadin, May 1893 (PC); Montpellier, C. Flabault 150 (PC); dans une source fraîche se jettent dans le Lac (Lauvitel) près le Bourge d'Oisans, C. Sauvageau, Aug. 1900 (PC). TUNISIA: Tozeur, M. Serpette TL59, 26 Mar. 1948 (D). ALGERIA: source d'Ain Oumach près Biskra, Sauvageau, Apr. 1892 (Types of *Dermocarpa Flabaultii* Sauvag. and *Entophysalis Cornuana* Sauvag., PC; isotypes D [Fig. 218]). TANGANYIKA: with *Cladophora inconspicua* G. S. West on stones, shore, Niamkolo, W. A. Cunningham (Type of *Palmophyllum foliaceum* G. S. West, in slide collection, BM). SOUTH AFRICA: im Flussbette der Kachembe, J. Menyhadt 335 (Type of *Placoma africana* Wille, in the slide collection of N. Wille, O).

NEW BRUNSWICK: boulder in stream, Grand Falls, H. Habeeb 10159, 20 Jul. 1947 (FC, HA); in Little river, Grand Falls, Habeeb 10424, 10562, 17 Jul., 16 Aug. 1948 (FC, HA); ledges in canyon, Grand Falls, Habeeb 10379, 10707, 12 Jul., 3 Sept. 1948 (FC, HA); shore of lake 8 miles south of Grand Falls, Habeeb 11664, 22 Jun. 1951 (FC, HA); in Rapide de Femme brook, fish hatchery, Grand Falls, Habeeb 10447, 21 Jul. 1948 (FC, HA); in Falls brook, Grand Falls, Habeeb 10453, 10500, 10667, 13353, 13372, 13373, 13375, 13405, Jun.—Aug. 1948 (FC, HA). MASSACHUSETTS: on stones, shore of Spot pond, Medford [parasitized material], F. S. Collins, 14 Aug. 1892 (as *Pleurocapsa fluvialis* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 555, FC, D, L, WU); in stone watering-trough, corner of Washington and Cedar streets, Woburn, Collins 5381, 9 Sept. 1905 (D, NY). RHODE ISLAND: on wet rocks, Mackerel cove, Conanicut island, Collins, 21 Apr. 1898 (FC, UC). CONNECTICUT: in shells, Twin lakes, Salisbury, W. A. Setchell & I. Holden, 24 Aug. 1895 (as *Hyella fontana* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 303, FC, L, WU). QUEBEC: on ledge in falls of Camp No. 3 river, 10.5 miles north of the hotel, road to Mt. Albert, Gaspé, H. Habeeb 1967, 29 Jun. 1951 (FC, HA). NEW YORK: Cattaraugus county: in Beeline creek near lake, Allegany state park, J. Blum 185 (H153), 29 Dec. 1948 (FC). Erie county: on wet sandstone, McKinley monument, Buffalo, I. Knobloch 80020, 16 Sept. 1944 (FC); escarpment below Busti avenue, Buffalo, Blum 171 (H167), 20 Jan. 1949 (FC); in south branch of Smoke creek at highway no. 20A near Orchard Park, Blum 209 (H192), 18 Feb. 1949 (FC). Genesee county: in Tonawanda creek at Indian Falls, Blum 330 (H273), 28 Jul. 1949 (FC). Ontario county: in Reed's creek, D. Haskins 42, 47a, 62, 1944 (FC). NEW JERSEY:

on a water-tank, Tricker's Water Gardens, Saddle River, Bergen county, *F. Drouet, H. Bold, & J. Rubinstein* 3869, 9 Jul. 1941 (FC); in the edge of Toms river at Toms River, Ocean county, *J. C. Bader* 206, 10 Sept. 1938 (FC). PENNSYLVANIA: Dauphin county: on submerged stems in spring, Derry Church, *F. Wolle*, 21 Oct. 1887 (FC, D). Lancaster county: *J. L. Blum* 113A, 18 Aug. 1948 (FC, PH); springs in Springs park, Lititz, *Blum* 106, *J. Wallace* 107, 9 Aug. 1948 (FC, PH), *R. Patrick* 106, Oct. 1948 (FC, PH); Lititz run and tributary east of Lititz, *Blum* 95, 110B, 5 & 6 Jul. 1948 (FC, PH); Mill creek 2.5 miles south of New Holland, *Blum* 88, 28 Jun. 1948 (FC, PH). Philadelphia: in basins of Wm. Leonidas springs and a spring at Strawberry Mansion bridge, Fairmount Park, *Drouet, Patrick, D. Richards, & C. Hodge* 5523, 5526, 5 Aug. 1944 (FC).

VIRGINIA: in stream entering Lake Matoaka, Williamsburg, *J. C. Strickland* 1240, 1239, 28 Jul. 1942 (FC, ST); on rocks in Moormans river below Sugar Hollow, Albemarle county, *Strickland* 657, 6 Oct. 1940 (FC, ST); on rock in Crab run west of McDowell, Highland county, *E. S. Luttrell & Strickland* 936, 26 Jul. 1941 (FC, ST); on rock in spring at Hawksbill Gap on Skyline drive, Madison county, *Luttrell* 3400, 25 Apr. 1942 (FC, ST). FLORIDA: Gainesville, *M. A. Brannon* 40, 160, 16 Feb. 1942, 11 Apr. 1943 (FC, PC); St. Marks river at Little Natural Bridge, *C. S. Nielsen, G. C. Madsen, & D. Crowson* 559, 30 Oct. 1948 (FC, T); Log Sulphur springs, Newport, Wakulla county, *Nielsen* 251, Aug. 1948 (FC, T); on stones in a large spring bathing pool north of Newport, *Drouet, Crowson, & R. Thorntom* 11400a, 25 Jan. 1949 (FC, T). OHIO: in Lake Erie on the south end of South Bass island, Ottawa county, *J. Blum* 300 (H244), 15 Jun. 1949 (FC); on cement wall, Lakeview fish hatchery, Cincinnati, *W. A. Daily* 195, 31 Oct. 1939 (DA, FC). KENTUCKY: concrete aquarium in greenhouse, University of Kentucky, Lexington, *B. B. McInteer* 1045, 19 Sept. 1939 (DA, FC). TENNESSEE: on concrete of pond, Mack's, 5 miles east of Knoxville, *H. Silva* 854, 18 Jun. 1949 (FC, TENN); concrete in lake outflow, Chilowee park, Knoxville, *Silva* 831, 18 Jun. 1949 (FC, TENN); concrete sides of fishpool, Ijam's place, Knoxville, *Silva* 1510, 20 Jul. 1949 (FC, TENN); rock in spring, Shadow farm near Decatur, Meigs county, *Silva* 961, 28 Jun. 1949 (FC, TENN); rock, Road Prong, Sevier county, *Silva* 448, 11 Jan. 1947 (FC, TENN); in drinking fountain, Newfound Gap, Sevier county, *Silva* 60, 317, 1891, 25 Aug. 1941, 3 Nov. 1946, 10 Sept. 1949 (FC, TENN); rocks in spray of falls, State Teachers College campus, Johnson City, Washington county, *Silva* 462, 14 Jan. 1947 (FC, TENN). MICHIGAN: Cheboygan county: in Black lake, *H. K. Phinney* 12M41/7, 206, 208, 24 Jul. 1941, 11 Aug. 1942 (FC, PHI); on pilings, Pigeon river near Indian River, *Phinney* 518, 11 Aug. 1943 (FC, PHI). Presque Isle county: on pipe of artesian spring, Cliff's place, Ocquioc Lake, *Phinney* 509, 29 Jul. 1943 (FC, PHI). INDIANA: Lowell, Lake county, *M. A. Brannon* 313, 10 Sept. 1945 (FC, PC); on dam and in mill race, Avoca state fish hatchery, Lawrence county, *F. K. & W. A. Daily* 2280, 2296, 2299, 1 Aug. 1950 (DA, FC); laboratory culture, Indiana University, Bloomington, *R. C. Starr*, 29 Jan. 1953 (FC); in Canyon creek near old quarry and in small falls of Echo canyon, McCormicks Creek state park, Owen county, *F. K. & W. A. Daily* 1772, 1792, 9 Aug. 1947 (DA, FC); in spring and fountain, Dunes state park, Porter county, *L. J. King*, 17 Sept. 1941 (FC); in a stream north of Whiting Boy Scout Camp, Dunes state park, *Drouet & H. B. Louderback* 5634a, 15 Jul. 1945 (FC); in the fountain at the courthouse, Richmond, *King*, 10 Nov. 1940 (EAR, FC); on rock, Thistlethwaites falls, Richmond, *King*, 3 Oct. 1940 (EAR, FC).

WISCONSIN: Madison: in fountain in B. B. Clarke park, *Louderback & Drouet* 5498, 23 Jul. 1944 (FC); dredged, Lake Mendota, *Forbes & A. B. Seymour*, Sept. 1885 (FC); in the source of Yahama river, Tenney park, *Louderback & Drouet* 5519, 5519a,b, 23 Jul. 1944 (FC). ILLINOIS: Cook county: in drinking fountains (Chicago & Michigan avenues, Jackson park, Grant park, Lincoln park), Chicago, *Drouet & Louderback* 5228, 5236, *Louderback* 4, Oct. 1943, 18 Jul. 1944 (D, FC), *K. C. Fan* 10630, 10640, 10645, 10646, 12 Sept. 1954 (D); laboratory culture, University of Chicago, *P. D. Vorh*, May 1945 (FC); on tank in greenhouses, University of Chicago, *Vorh, J. M. Beal, & Drouet* 2375, 5 Oct. 1938 (FC); rocks in quarry at Sag Bridge at 111th street, *King & J. O. Young* 457, 3 Aug. 1941 (FC); on a sink in the greenhouse, Northwestern University, Evanston, *Drouet, H. K. Phinney, F. A. Barkley, & D. Richards*, 17 Mar. 1945 (FC). Kane county: in a fountain in Pottawatomie park and in a shell in Fox river south of Main street, St. Charles, *Louderback & Drouet* 5313, 5333, 14-15 Apr. 1944 (FC). Livingston county: in shells in Vermilion river near Mill street, Pontiac, *Drouet & Louderback* 5201, 5211a, 5248, Sept.—Oct. 1943 (FC). MISSISSIPPI: outlet of the freshwater reservoir in the western part of Gulfport, *Drouet & R. L. Caylor* 9944a, 9945, 12 Dec. 1946 (FC). MINNESOTA: Mississippi river headwaters, Itasca state park, *Drouet, Fan & J. Rowley* 11974, *Fan* 10160, 21 June 1954; in Sucker creek west of Lake Itasca post office, Clearwater county, *Drouet, T. Morley & Fan* 11901, 17 June 1954 (D, MIN). IOWA: in a drinking fountain in the city park, McGregor, Clayton county, *Drouet & Louderback* 5162, 20 Aug. 1943 (D, FC). MISSOURI: on rocks in Gravois springs, Gravois Mills, Morgan county, *F. Drouet* 1234, 1237, 19 Aug. 1934 (D); on rocks in spring, Monegaw Springs, St. Clair county, *Drouet* 730, 4 Oct. 1930 (D); on pebbles in White river south-east of Mincy, Taney county, *J. A. Steyermark* 40099, 20 Jun. 1941 (FC). LOUISIANA: on turtle, Baton Rouge, *L. H. Flint*, 13 Oct. 1947 (FC).

NEBRASKA: Banner county: rock in streamlet north of Harrisburg, *W. Kiener* 22142, 22 May

1947 (FC, KI). Cherry county: pebbles in Minnechaduz creek, fish hatcheries, Valentine, *Kiener* 23825, 18 Jun. 1948 (FC, KI). Cheyenne county: rocks in Lodgepole creek east of Potter, *Kiener* 22613a, 22614, 22615, 22618a, 22621, 16 Aug. 1947 (FC, KI). Dakota county: back of Mississippi Map Turtle, Crystal lake, Dakota City, *Kiener* 21778, 21778b, 17 Feb. 1947 (FC, KI). Dawes county: rock in Chadron creek, Chadron state park, *Kiener* 20370, 20370a, 20371a, 20375a, 20413, 20415, 15 May 1946 (FC, KI). Dundy county: on pebbles in creek 8 miles north of Max, *Kiener* 10595, 29 Jul. 1941 (FC, KI); pebbles in outlet of fishponds, Rock Creek Hatchery, *Kiener* 19566, 3 Aug. 1945 (FC, KI); on rock and bark in water, Rock Creek Lake state park, 25064, 25115b, 25161, 21 May 1947, 21—22 Nov. 1949 (FC, KI); rocks in seepage near park north of Parks, *Kiener* 21886, 28 Mar. 1947 (FC, KI). Garden county: pebbles in Blue creek north of Oshkosh, *Kiener* 23106, 23108, 2 Apr. 1948 (FC, KI). Keith county: on rock in Otter creek northwest of Ogallala, *Kiener* 21056, 6 Jul. 1946 (FC, KI); pebbles, Loneran creek springs, Lemoyne, *Kiener* 23389, 23408, 4 May 1948 (FC, KI). Lancaster county: watering-tank 9 miles northwest of Lincoln, *Kiener* 12937, 20 Aug. 1942 (FC, KI); on wood in runoff of tank 14 miles northwest of Lincoln, *Kiener* 12979b, 29 Aug. 1942 (FC, KI); bird fountain, Lincoln, *Kiener* 23915, 28 Jun. 1948 (FC, KI); on turtle, Lincoln, *Kiener* 24101, 10 Aug. 1948 (FC, KI). Morrill county: pebbles in Lawrence Fork creek, southwest of Redington, *Kiener* 22737a, 22738, 21 Aug. 1947 (FC, KI); drainage ditch, west edge of Bayard, *Kiener* 25136, 23 Nov. 1949 (FC, KI). Scotts Bluff county: pebbles in marsh pond northeast of Morrill, *Kiener* 22793, 24 Aug. 1947 (FC, KI); rocks in Akers Draw, Morrill, *Kiener* 22124b, 22126a, 25063, 25064, 25115b, 25161, 21 May 1947, 21—22 Nov. 1949 (FC, KI); rocks in seepage near Mitchell, *Kiener* 25161, 25164, 21 Nov. 1949 (FC, KI).

TEXAS: rocks from shallow stream, Austin, *F. A. Barkley* T1004, 5 Dec. 1942 (FC, TEX); New Braunfels, *L. H. Flint* 3, 18 Nov. 1954 (D); on tub and rocks at bath house, Hot Springs, Brewster county, *E. Whitehouse* 24643, 24645, 24 Dec. 1950 (FC). MONTANA: rocks in running water 0.5 mile east of Potter canyon slaughterhouse, Missoula county, *S. R. Ames & F. A. Barkley* 18, 26 Aug. 1940 (FC). COLORADO: wet cliff, Chasm gorge, Long's Peak, *W. Kiener* 4187a, 21 Sept. 1936 (FC, KI); culture from cold streamlet, Granite Basin, Longs Peak, *Kiener* 1281, 21 Mar. 1943 (FC, KI); in drinking fountains, Denver, *Drouet, D. Richards, & J. Rubinstein* 4097, 6 Sept. 1941 (FC), *Drouet & H. B. Louderback* 5731, 18 Aug. 1946 (FC), *Louderback* 5, 22 Aug. 1947 (FC). NEW MEXICO: on rocks in a pond in the lava-beds 6—8 miles east of Grant, Valencia county, *A. A. Lindsey* 2E, 26 Aug. 1944 (FC). UTAH: on rock in pothole at falls, Mt. Timpanogos, Utah county, *A. O. Garrett* 73, 16 Aug. 1925 (FC, UC); in fountain in front of main building, Utah Agricultural college, Logan, *G. Piranian*, 30 Sept. 1933 (FC). NEVADA: in a drinking-fountain in the park along the Truckee river, Reno, *Drouet & Richards* 4112, 9 Sept. 1941 (FC). WASHINGTON: in Columbia river, Richland, *R. Genoway*, 15 Dec. 1952 (FC). CALIFORNIA: Alameda county: in a brook, Lake Chabot, San Leandro, *W. J. V. Osterhout & N. L. Gardner* 541, 28 Jun. 1902 (FC, UC); water-trough, Oakland, *Gardner* 20, Oct. 1900 (UC). Napa county: on a cement runway, Seigler hot springs, *Gardner* 7474, 7 Aug. 1933 (FC, UC). San Bernardino county: Harlem hot springs, *W. A. Setchell* 1560, 19 Dec. 1896 (Type of *Dermocarpa Setchellii* Dr., FC; isotype, UC). San Francisco: culture from Lake Merced, *Gardner* 6837, 2 Oct. 1931 (Type of *D. Gardneriana* Dr., FC, isotype, UC); on shells, Mountain lake (parasitized material), *Osterhout & Gardner* 545, 24 June 1902 (FC, UC; as *Pleurocapia 'concharum'* in Coll., & Setch., Phyc. Bot.-Amer. no. 1051, FC, L, UC, WU); culture from a dripping water-pipe, Golden Gate park, *Gardner* 890a, 21 Feb. 1933 (FC, UC). Santa Clara county: in rapids of Coyote creek, San José, *J. F. Macbride* 7806a, Sept. 1944 (FC). Siskiyou county: in seepage at the base of a cliff along Sacramento river, Dunsmuir, *Drouet & Richards* 4203, 15 Sept. 1941 (FC). Sonoma county: on dripping rocks in hot water, the Geysers, *Gardner & Bonar* 7519, 7519a, 8 Aug. 1933 (FC, UC). Tulare county: in Tule river, Porterville, *Drouet & M. J. Groesbeck* 4443, 4 Oct. 1941 (FC); in a water-fountain, Burnett park, east of Porterville, *Drouet & Groesbeck* 4496a, 5 Oct. 1941 (FC).

PUERTO RICO: on limestone, waterfall between Arecibo and Utuado, *N. Wille* 1458b, 4 Mar. 1915 (Type of *Chroococcus minutissimus* Gardn., NY [Fig. 232]); Morrillo de Cabo Rojo, *N. L. Britton* 4375, Feb. 1915 (UC); on pebbles in a stream of warm water by the hot spring, Coamo Springs, *Wille* 381, 12 Jan. 1915 (Type of *Entophysalis chlorophora* Gardn., NY [Fig. 233]; isotype, D, UC); auf Steine im Flusse bei Fajardo, *Wille* 680a, 684, 26 Jan. 1915 (FC, NY); on stones in a brook west of Humacao, *Wille* 593, Jan. 1915 (Type of *Radaisia Willei* Gardn., NY; isotypes, D, UC); in a fountain in the woods near Maricao, *Wille* 1076, Feb. 1915 (Type of *Radaisia confluens* Gardn., NY [Fig. 228]; isotypes, D, UC). MEXICO: from rocks, lower hot springs, Baños de Agua Caliente, Hildalgo, *R. Patrick* 95, 15 Jul. 1947 (FC, PH); spring, San José de Purua, Michoacan, *Patrick* 427, 4 Aug. 1947 (FC, PH). GUATEMALA: on pebbles in small stream, Quebrada Shusho above Chiquimula, *P. C. Standley* 74337, 14 Oct. 1940 (FC); on rocks in sulfur spring, shore of Laguna Petexbatum south of Sayaxché, dept. Petén, *J. A. Steyermark* 46232a,b, 3 May 1942 (FC). HONDURAS: on metal water tanks, Comayagua, *Standley & J. Chacón* P. 5632, 5781, Mar. 1947 (FC); on side of hydrant, La Lima, dept. Cortés, *Standley &*

Chacón P. 7150, Apr. 1947 (FC). EL SALVADOR: in very warm water from sulfur spring, Ahuachapán, Standley & E. Padilla V. 2451, Jan. 1947 (FC); in shallow pool of stream, Metapán, dept. Santa Ana, Standley & Padilla V. 3256, 29 Jan.—1 Feb. 1947 (FC). VENEZUELA: dripping cave in lime bluff along Rio Zumbador near base of Piedra Blanca, northeast of Bergantín, Anzoátegui, Steyermark 61284, 1—2 Mar. 1945 (FC). PERU: La Encantada, Lago Chilca, A. Maldonado 60, Jan. 1942 (FC).

HAWAIIAN ISLANDS: Kaelepuhu stream, Kailua, Oahu, M. S. Doty 12491, 3 Aug. 1954 (D). SAMOA ISLANDS: [auf Felsen, Insel Savaii] K. H. Rechinger 2834 (Type of *Entophysalis samoensis* Wille in the slide collection of N. Wille, O). NEW ZEALAND: in basin, Black Terraces, Taupo (East Taupo), Setchell 6010a(101), 13 May 1904 (FC, UC). INDONESIA: in oolithis in fonte Tjeding in monte Idjen in Java Orientali, C. E. B. Bremekamp (Type of *Aphanocapsa constructrix* Bremek. in the collections of the Mineralogisch-Geologisch Instituut of the University of Utrecht); Tjibodas, Java, Ruttner (paratype of *Chamaesiphon polymorphus* Geitl., slides Tj21e and Tj211c α in the collection of L. Geitler); Steine in Spritzwasser der Rinne, in der Bambu-Abflussrinne des Beckens, Gefasste Quelle am linken Seraju-Ufer, oberhalb der Dessa Patakbanteng, Dijeng-Plateau, Java, Ruttner, 3 Jun. 1929 (Type of *Chlorogloea major* Geitl., slide no. D6be in the collection of L. Geitler); Nostoc-Lager, Umgebung des T. Pasir, Wasserfall des Pagarede (Pasergede), Java, Ruttner, 9 Dec. 1928 (Type of *Chamaesiphon fallax* Geitl., slide no. SW1b β in the collection of L. Geitler); Stein aus dem Mittellauf des Quellbaches, starke Quelle am SE-Ufer, Ranu Pakis, Java, Ruttner, 29 Oct. 1928 (Type of *Chlorogloea purpurea* var. *minutissima* Geitl., slide no. KPQ1d in the collection of L. Geitler); Ranau-See, Süd-Sumatra, Ruttner, 1929 (paratype of *Chroococcopsis gigantea* Geitl., slide no. R4h α in the collection of L. Geitler), 27 Jan. 1929 (Type of *Cyanodermatium violaceum* Geitl., slide no. RA2 in the collection of L. Geitler), 28 Jan.—5 Feb. 1929 (Type of *Radaisia gigas* Geitl., slide no. R5a β in the collection of L. Geitler), 1—5 Feb. 1929 (Type of *Cyanodermatium gelatinosum* Geitl., slide no. R4d in the collection of L. Geitler); an Steinen im unteren Becken, Bukit Kili, Sumatra, Thienemann, 2 Mar. 1929 (Type of *Myxosarcina spectabilis* Geitl., slide no. SkW1b in the collection of L. Geitler). INDIA: auf Schnecken-schalen in einem See in der Stadt Poona, A. Hansgirg (Type of *Chroococcus Hansgirgii* Schmidle, ZT [Fig. 229]). EGYPT: Sinai[halbinsel, am Fusse des Dschebel Hamàn, A. Kneucker, 16 Apr. 1904] (Type of *Guyotia singularis* Schmidle, ZT [Fig. 222]).

4b. *ENTOPHYSALIS RIVULARIS* f. *PAPILLOSA* (Kütz.) Drouet & Daily, STAT. NOV. *Palmella papillosa* Kützinger, Phyc. Germ., p. 149. 1845. *Polycoccus papillosus* Roemer, Alg. Deutschl., p. 65. 1845. *Cagniardia papillosa* Trevisan, Sagg. Monogr. Alg. Coccot., p. 50. 1848. *Entophysalis papillosa* Drouet & Daily, Lloydia 11: 79. 1948. —Type from the Harz mountains, Germany (L.). FIG. 375.

Sphaerogonium fuscum Rostafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Math.-Przyr., 10: 295. 1883. *Chamaesiphon fuscus* Hansgirg, Oesterr. Bot. Zeitschr. 38: 117. 1888. —Topotypes from Kalatowkach, Poland (FH, WU).

Xenococcus britannicus Fritsch in West & Fritsch, Brit. Freshw. Alg., p. 467. 1927. *Oncobyrsa britannica* Fritsch pro synon., loc. cit. 1927. *Chamaesiphonopsis regularis* Fritsch, New Phytol. 28: 173. 1929. *Chamaesiphon regularis* Geitler, Rabenh. Krypt.-Fl. Eur. 14: 440. 1932. —Type from Devonshire, England (in the collection of F. E. Fritsch).

Chamaesiphon pseudo-polymorphus Fritsch, New Phytol. 28: 176. 1929. —Type from Devonshire, England (in the collection of F. E. Fritsch).

The original specimen of the following has not been available to us; its original description is designated as the Type until the specimen can be found:

Chamaesiphon Geitleri H. Luther, Acta Bot. Fennica 55: 33. 1954.

Cellulae solitariae et ad basem strati aut pulvini cylindricae vel longi-ellipsoideae. FIGS. 374, 375.

On rocks, shells, woodwork, etc. in fresh water, chiefly in clear streams, springs, and fountains. *Entophysalis rivularis* f. *papillosa* may eventually prove to be only a growth-form of f. *rivularis* developing under special environmental conditions.

Specimens examined:

CRIMEA: in rivulo Ulu-usenji, N. N. Woronichin, 31 Aug. 1929 (FC, FH). POLAND: zbierane na kamkach granitowych w wywierzyisku Dunajca Białego w Kalatówkach, M. Raciborski, Oct. 1909 (topotype of *Sphaerogonium fuscum* Rostaf. as *Chamaesiphon fuscus* in Racib., Phyc. Polon. no. 10, FH,

WU). GERMANY: in rivulis montium ad saxa, Freiburg im Breisgau, *A. Braun* 41, 1848 (L, NY), 1849 (PC); in Bäche des Oberharzes, *Römer* 148 (Type of *Palmella papillosa* Kütz., L [Fig. 375]; isotype, UC). CZECHOSLOVAKIA: Bohemia: am Wege von Deffernik zu Lackasee bei Eisenstein, *A. Hansgirg*, Aug. 1887 (FC, W); in aquaeductu ligneo fontis ad Deffernik prope Eisenstein, *Hansgirg*, 25 Aug. 1887 (as *Oncobyrsa rivularis* in Wittr. & Nordst., Alg. Exs. no. 999, FC, L, WU). ENGLAND: River Heddon, Devon, *F. E. Fritsch*, 5 Sept. 1920 (Type of *Chamaesiphon pseudopolymorphus* Fritsch in the collection of F. E. Fritsch [Fig. 374]; isotype, D); East Lyn, north Devon, *Fritsch*, 2 Sept. 1918 (Type of *Xenococcus britannicus* Fritsch in the collection of F. E. Fritsch; isotype, D). NEW BRUNSWICK: on rocks in a spring, Alma, Albert county, *H. Habeeb* 11681, 26 Jul. 1951 (FC, HA). NEW YORK: on rusty pipe in Hudson river, Warrensburg, *J. Bader* 183, 5 Aug. 1938 (FC). PUERTO RICO: on twigs in a stream near Maricao, *N. Wille* 1260, Feb. 1915 (NY).

5. ENTOPHYSALIS LEMANIAE (Ag.) Dr. & Daily.

Plantae primum microscopicae (saepius cellulae solitariae) deinde in pulvina macroscopica aeruginea, olivacea, brunnea, violacea, vel rubra increscentes, cellulis solitariis primo sphaericis aetate provecta ovoideis, cylindraceis, cylindraceo-ellipsoideis, vel lineari-tubaeformibus, diametro 1—6 μ crassis, erectis vel varie curvatis cellulis pulvini juvenilis ellipticis vel cylindricis erectis, in pulvinis maturis sphaericis, ovoideis, vel polyhedroideis, diametro 2—8 μ crassis; endosporangiis sphaericis, ovoideis, vel pyriformibus, diametro ad 25 μ crassis; gelatino vaginale primum hyalino demum lutescente, homoganeo vel laminoso; protoplasmate aerugineo, olivaceo, violaceo, vel roseo, homoganeo. FIGS. 221, 235—246.

The commonly encountered growth-forms of *Entophysalis Lemaniae* are the solitary cells which develop in profusion on filamentous algae (*Cladophora* spp., *Oedogonium* spp., *Plectonema Wollei* Farl., etc.) and other plants which persist throughout a season in a habitat. On perennial vegetation, such as *Lemanea* spp., bryophytes, and certain Podostemaceae, the microscopic cushion-shaped masses are sometimes found; their rarity, however, may in large part be due to their destruction by fungi.

Key to forms of *Entophysalis Lemaniae*:

Solitary cells spherical to cylindrical f. LEMANIAE

Solitary cells linear-cylindrical and long-stipitate f. ELONGATA

5a. ENTOPHYSALIS LEMANIAE f. LEMANIAE. *E. LEMANIAE* (Agardh) Drouet & Daily, COMB. NOV. *Nostoc Lemaniae* Agardh, Syst. Algar., p. 20. 1824. *Nostocella Lemaniae* Gaillon, Aperçu d'Hist. Nat., p. 28. 1833. *Oncobyrsa Lemaniae* Gomont, Bull. Soc. Bot. Fr. 43: 377. 1896. *Hydrococcus Lemaniae* Bornet pro synonym. in Gomont, loc. cit. 1896. —Type from Scania, Sweden (PC). FIG. 239.

Oncobyrsa Brebissonii Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 96. 1843. *Nostoc fluviale* Brébisson pro synonym. in Meneghini, loc. cit. 1843. *Hydrococcus Brebissonii* Kützing, Tab. Phyc. 1: 23. 1846. *Oncobyrsa rivularis* var. *Brebissonii* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 93. 1891. *Entophysalis Brebissonii* Drouet & Daily, Lloydia 11: 79. 1948. —Type from Falaise, France (L). FIG. 245.

Hydrococcus Cesatii Rabenhorst, Alg. Sachs. 93 & 94: 922. 1860. *Oncobyrsa Cesatiana* Rabenhorst, Fl. Eur. Algar. 2: 68. 1865. —Type from Oropa, Piedmont, Italy (D). FIG. 221.

Chamaesiphon confervicola A. Braun in Rabenhorst, Fl. Eur. Algar. 2: 148. 1865. *Brachythrix confervicola* A. Braun pro synonym. in Rabenhorst, loc. cit. 1865. —Type from Giessen, Germany (NY).

Chamaesiphon confervicola f. *elongatus* Rabenhorst, Fl. Eur. Algar. 2: 149. 1865. —Type from Giessen, Germany (NY).

Chamaesiphon incrustans Grunow in Rabenhorst, Fl. Eur. Algar. 2: 149. 1865. *Sphaerogonium*

- incrustans* Rostafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Mat.-przycz., 10: 282. 1883. —Type from Windisch-Garsten, Upper Austria (W).
- Chamaesiphon Schiedermayeri* Grunow in Rabenhorst, Fl. Eur. Algar. 2: 149. 1865. *C. confervicola* var. *Schiedermayeri* Borzi ex Hansgirg, Prodr. Algenfl. Böhmen 2: 124: 1892. —Type from Milchdorf, Upper Austria (W).
- Chamaesiphon Schiedermayeri* f. *subclavatus* Grunow in Rabenhorst, Fl. Eur. Algar. 2: 149. 1865. —Type from Vöcklabruck, Upper Austria (W).
- Sphaenosiphon aquae-dulcis* Reinsch, Contrib. Algol. & Fungol. 1: 15. 1874. *Dermocarpa aquae-dulcis* Geitler in Pascher, Süßwasserfl. 12: 142. 1925. —Type from Dalmatia (K).
- Chamaesiphon curvatus* Nordstedt, Alg. Aq. Dulc. & Charac. Sandvicens., p. 4. 1878. *Sphaerogonium curvatum* Rostafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Math.-Przycz., 10: 292. 1883. *Chamaesiphon confervicola* var. *curvatus* Borzi ex Hansgirg, Prodr. Algenfl. Böhmen 2: 124. 1892. —Type from near Honolulu, Hawaiian islands (PC).
- Chamaesiphon curvatus* f. *elongatus* Nordstedt, Alg. Aq. Dulc. & Charac. Sandvicens., p. 4. 1878. *C. curvatus* var. *elongatus* Nordstedt ex Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 100. 1907. —Type from near Honolulu, Hawaiian islands (PC).
- Godlewskia aggregata* Janczewski, Ann. Sci. Nat. VI. Bot. 16: 229. 1883. *Chamaesiphon aggregatus* Geitler in Pascher, Süßwasserfl. 12: 157. 1925. —Type from Krakow, Poland (PC).
- Xenococcus Kernerii* Hansgirg, Physiol. & Algol. Stud., p. 111. 1887. *Dermocarpa Kernerii* Hansgirg, Physiol. & Phycophyt. Unters., p. 234. 1893. *Pleurocapsa Kernerii* Drouet, Field Mus. Bot. Ser. 20: 125. 1942. —Type from Eisenbrod, Bohemia (FH).
- Chamaesiphon incrustans* f. *minor* Möbius, Hedwigia 27: 246. 1888. —Topotypes and paratypes from Coamo, Puerto Rico (D, MO, FC).
- Pleurocapsa fluvialis* Lagerheim, Notarisia 3: 430. 1888. *Xenococcus fluvialis* Geitler, Beih. z. Bot. Centralbl., II, 41: 245. 1925. —Type from Freiburg in Breisgau, Germany (DT). FIG. 240.
- Oncobyrsa hispanica* Lewin, Bih. t. Sv. Vet.-Akad. Handl., Afd. 3, 14(1): 4. 1888. —Type from Yunquera (Malaga), Spain (S).
- Dermocarpa depressa* W. & G. S. West, Journ. of Bot. 35: 301. 1897. —Type from Sassanga island, Loanda, Angola (BM). FIG. 244.
- Chroococcus varius* f. *samoensis* Wille, Hedwigia 53: 144. 1913. *C. varius* var. *samoensis* Wille ex J. de Toni, Diagn. Alg. Nov. I. Myxophyc. 3: 292. 1938. —Type from Upolu, Samoa (O).
- Chroococcus turgidus* var. *subviolaceus* Wille, Hedwigia 53: 144. 1913. —Type from Savaii, Samoa (O).
- Xenococcus minimus* Geitler, Ber. Deutsch. Bot. Ges. 40: 284. 1922. —Type from Vienna, Austria (W). FIG. 241.
- Dermocarpa chamaesiphonoides* Geitler, Ber. Deutsch. Bot. Ges. 40: 283. 1922. —Type from Vienna, Austria (W). FIG. 237.
- Chamaesiphon cylindricus* Boye Petersen, Bot. Icel. 2(2): 272. 1923. —Type (in the collection of J. Boye Petersen) from Husavik, Iceland. FIG. 238.
- Pleurocapsa epiphytica* Gardner, Mem. New York Bot. Gard. 7: 31. 1927. *Radaisia epiphytica* Gardner, New York Acad. Sci. Sci. Surv. Porto Rico 8(2): 264. 1932. —Type from near Mayaguez, Puerto Rico (NY).
- Xenococcus Willei* Gardner, Mem. New York Bot. Gard. 7: 33. 1927. —Type from near Coamo, Puerto Rico (NY). FIG. 236.
- Chamaesiphon portoricensis* Gardner, Mem. New York Bot. Gard. 7: 33. 1927. *C. minutus* var. *major* Geitler, Rabenh. Krypt.-Fl. Eur. 14: 429. 1932. —Type from Coamo Springs, Puerto Rico (NY). FIG. 243.
- Xenococcus chroococcoides* Fritsch, New Phytol. 28: 186. 1929. —Type from Devonshire, England (in the collection of F. E. Fritsch). FIG. 242.
- Xenococcus minimus* var. *Starmachii* Geitler, Rabenh. Krypt.-Fl. 14: 333. 1932. —Paratype named by the author from Danan Manindjau, Sumatra, Indonesia (in the collection of L. Geitler).
- Dermocarpa clavata* Geitler, Rabenh. Krypt.-Fl. 14: 406. 1932. *D. clavata* var. *aquae-dulcis* Geitler, ibid. 14: 1173. 1932. —Type from Ranau Bedali, Java, Indonesia (in the collection of L. Geitler). Both of these names appear to be based upon the same type.
- Dermocarpa xenococcoides* Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 625. 1933. —Type from Ranau Bedali, Java, Indonesia (in the collection of L. Geitler).
- Chamaesiphon minutus* var. *gracilior* Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 625. 1933. —Type from Singkarak lake, Sumatra, Indonesia (in the collection of L. Geitler).
- Chamaesiphon subglobosus* var. *major* Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 625. 1933. —Type from Tjibodas, Java, Indonesia (in the collection of L. Geitler).
- Pleurocapsa subgelatinosa* Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 626. 1933; ex Borge, Ark. f. Bot. 25A(17): 5. 1933. —Type from Kota Baru, Sumatra, Indonesia (in the collection of L. Geitler).

Chamaesiphon mollis Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 626. 1933. —Type from Tjibodas, Java, Indonesia (in the collection of L. Geitler).

Dermocarpa Hollenbergii Drouet, Field Mus. Bot. Ser. 20: 129. 1942. —Type from Mojave desert, California (D). FIG. 235.

Dermocarpa Solheimii Drouet, Field Mus. Bot. Ser. 20: 129. 1942. —Type from Medicine Bow national forest, Wyoming (FC).

Dermocarpa minuta Drouet, Field Mus. Bot. Ser. 20: 130. 1942. —Type from Tiburon, California (FC).

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Linckia fragiformis Roth, Catal. Bot. 3: 345. 1806. —See Brébisson in Hedwigia 9: 65 (1870) and Hansgirg, Prodr. Algenfl. Böhmen 2: 130. 1892.

Chamaesiphon torulosus Borzi, N. Giorn. Bot. Ital. 14: 313. 1882.

Cyanocystis versicolor Borzi, N. Giorn. Bot. Ital. 14: 314. 1882. *Dermocarpa versicolor* Geitler in Pascher, Süswasserfl. 12: 142. 1925.

Sphaerogonium minutum Rostafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Mat.-Przyr., 10: 290. 1883. *Chamaesiphon minutus* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 98. 1907.

Sphaerogonium amethystinum Rostafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Mat.-Przyr., 10: 291. 1883. *Chamaesiphon amethystinus* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 99. 1907.

Chamaesiphon incrustans var. *laxus* Reinsch, Deutsche Polar Exped. 2: 334. 1890.

Xenococcus gracilis Lemmermann, Abh. Nat. Ver. Bremen 14: 510, footnote. 1898.

Chamaesiphon minimus Schmidle, Engler Bot. Jahrb. 30: 62. 1901. *C. africanus* var. *minimus* Lemmermann, Krypt.-Fl. Mark Brandenb. 3: 99. 1907.

Chamaesiphon africanus Schmidle, Engler Bot. Jahrb. 30: 62. 1901.

Chamaesiphon sphagnicola Maillefer, Bull. Herb. Boissier, ser. 2, 7: 44. 1906. *Dermocarpa sphagnicola* Geitler in Pascher, Süswasserfl. 12: 143. 1925.

Chamaesiphon curvatus var. *Turneri* Forti, Syll. Myxophyc., p. 140. 1907.

Cyanocystis parva Conrad, Ann. Biol. Lac. 7: 130. 1914. *Dermocarpa parva* Geitler in Pascher, Süswasserfl. 12: 142. 1925.

Chamaesiphon incrustans f. *asiaticus* Wille in Hedin, Southern Tibet 6(3, Bot.): 166. 1922.

Chamaesiphon incrustans f. *longissimus* Wille in Hedin, Southern Tibet 6(3, Bot.): 167. 1922.

Chamaesiphon oncobyroides Geitler, Arch. f. Protistenk. 51: 330. 1925.

Chamaesiphon incrustans var. *elongatus* Starmach, Spraw. Kom. Fizjog. Polsk. Akad. Umiej. 1926: 110. 1927.

Dermocarpa aquae-dulcis var. *tatrensis* Starmach, Spraw. Kom. Fizjog. Polsk. Akad. Umiej. 62: 10. 1928.

Chamaesiphon carpaticus Starmach, Acta Soc. Bot. Polon. 6: 34. 1929.

Chamaesiphon sideriphilus Starmach, Acta Soc. Bot. Polon. 6: 32. 1929.

Dermocarpa Plectonematis Frémy, Ann. de Bot. Caen 3 (Mem. 2): 66. 1930.

Chamaesiphon sideriphilus var. *glabrus* B. Rao, Proc. Indian Acad. Sci. 6: 347. 1937.

Xenococcus Lyngbyae Jao, Sinensia 10: 180. 1939.

Chamaesiphon clavatus Jao, Sinensia 10: 181. 1939.

Chamaesiphon Duran-Mileri Gonzalez Guerrero, Anal. Jard. Bot. Madrid 6: 249. 1946.

Dermocarpa versicolor var. *subsalsa* Proschkina-Lavrenko, Akad. Nauk S. S. S. R. Otd. Sporovykh. Rost. Bot. Mater. 6: 70. 1950.

Chlorogloea sinensis Chu, Ohio Journ. Sci. 52(2). 101. 1952.

Cellulae solitariae primum sphaericae aetate provecta ovoideae, cylindricae, vel cylindraceo-ellipsoideae. FIGS. 221, 235—245.

On larger algae, mosses, and other plants in clear running fresh water of permanent streams, lakes, springs, and fountains. In old cultures containing this form, the endospores and the daughter cells produced by the solitary cells are often seen covering the walls of whatever larger plants are present. The solitary cells may be confused with those of *Clastidium setigerum*, *Stichosiphon sansibaricus*, and *Crenothrix polyspora* Cohn.

Specimens seen:

FINLAND: on *Fontinalis antipyretica* L. in stream 20 km. northwest of Helsingfors, Collander & W. H. Welch 5660, 8 Jul. 1938 (FC); in *Hygroamblystegio fluviatilis* ad saxa submersa amnis Pusulanjoki, par. Pusula (Nylandia), V. F. Brotherus, 7 Jul. 1916 (FC). NORWAY: with *Schizothrix tinctoria* (Ag.) Gom. on *Fontinalis antipyretica*, Lillesand, Schüßeler, 1846 (FC). SWED-

EN: in muscis aquaticis, Nacka, *G. Lagerheim*, Jun. 1883 (S); in rivulis Scaniae, *C. A. Agardh*, 1824 (Type of *Nostoc Lemaniae* Ag., PC [Fig. 239]); in *Cladophora fracta* in Lacu Valloxen Uplandiae, *V. Wittrock*, 27 Oct. 1878 (as *Chamaesiphon confervicola* in Witt. & Nordst., Alg. Exs. no. 293, FC, L, S). POLAND: sur le Batrachospermum, Cracovie, *E. Janczewski*, 20 Apr. 1883 (Type of *Godlewskia aggregata* Jancz., PC), 22 Aug. 1885 (PC). ROMANIA: ad Cladophoram apud Baneasa prope Bucuresti, *Dna. O. Malinescu* 1056, 18 May 1896 (FC, W). GERMANY: Freiburg in Breisgau, *G. Lagerheim*, Jul. & Dec. 1887 (Type of *Pleurocapsa fluviatilis* Lagerh., DT [Fig. 240]); auf *Fontinalis antipyretica* L., Laubach (Hesse), *G. Roth*, Jul. 1908 (FC); auf *Cladophora gossypina* var. *intricata*, Giessen (Hesse), *A. Braun*, Dec. 1850 (Type of *Chamaesiphon confervicola* A. Br. and f. *elongatus* Rabenh., NY; isotypes, FH, PC, S); auf Chantrynsia, Leipzig, *P. Richter* (UC); auf *Cinclidotus aquaticus* in Gebirgsbächen im Schwarzwald (Württemberg), *P. Reinsch* (FC). CZECHOSLOVAKIA: Bohemia: Dobrá Voda u Budejovic, *A. Hansgirg*, Aug. 1883 (FC, W); in canalibus molarum ligneis ad Eisenbrod, *Hansgirg* (Type of *Xenococcus Kernerii* Hansg. on *Scytonema cinnatum* in Kerner, Fl. Exs. Austro-Hungar. no. 1596, FH); auf Chantrynsia, Leipzig, *Cladophora*, *Kaplitz, Hansgirg*, Sept. 1885 (FC, W); Stríbro & Tábor, *Hansgirg*, Aug. 1883 (FC, W); Zel. Brod, *Hansgirg*, Jul. 1885 (FC, W). AUSTRIA: Upper Austria: auf *Calothrix Wrangelii* auf Steinen im Moosbache bei Milchdorf, *Schiedermayer* (Type of *Chamaesiphon Schiedermayeri* Grun., W); auf *Calothrix Brebissonii*, Vöcklabruck, von Mörl (Type of *Chamaesiphon Schiedermayeri* f. *subclavatus* Grun., W); Seebach am Glinkersee bei Windisch-Garsten, *Schiedermayer*, Nov. 1865 (Type of *C. incrustans* Grun., W. isotypes in Rabenh. Alg. no. 1944, FH, PC). Lower Austria: auf *Cladophora putealis* in einem Brunnen zu Hörnstein, *A. Grunow*, Jul. 1864 (as *Chamaesiphon confervicola* in Rabenh. Alg. no. 1726, FH, PC); insidentes muscis sub aqua decavente canalis molendarii rivi Fischadagnitz ad Unter-Waltersdorf, *S. Stockmayer* (as *Oncobyrsa rivularis* in Mus. Vindob. Krypt. Exs. no. 744, FC, L, WU); auf *Cladophora* in einem Kulturglas, Wien, *L. Geitler* (Type of *Dermocarpa chamaesiphonoides* Geitl. and *Xenococcus minimus* Geitl., W [Figs. 237, 241]).

JUGOSLAVIA: Slovenia: in *Lemanea fluviatilis*, Kaltenbrunn prope Laibach, *A. Hansgirg*, Aug. 1889 (FC, W); in *Tolypothrix penicillata* in fonte parvo prope Kronau, *K. de Keissler* (as *Chamaesiphon minutus* in Mus. Vindob. Krypt. Exs. no. 1949, FC, L, NY, S). Croatia: Mühlbach in Martinsica bei Fiume, *F. Hauck*, Sept. 1878 (L). Dalmatia: in *Cinclidotus unacum Chantrynsia violacea*, herb. *P. Reinsch* (Type of *Sphaenosiphon aquae-dulcis* Reinsch, K); Knin, *Hansgirg*, Aug. 1888 (FC, W); Ombla prope Ragusa et Topla—Gruda prope Castelnuovo, *Hansgirg*, 1891 (FC, W). TRIESTE: Zaule, *Hauck* 1558, 18 Mar. 1870 (FC, FH, PC). ITALY: on mosses, Treviso, *G. Venturi*, 1857 (FC); Roveredo, *A. Hansgirg*, 1891 (FC, W); ad *Fontinalem antipyreticam* in rivulis per prata excurrentibus all'Oropa, dition. Bugellens. (Piedmont), *Cesati*, Aug. 1859 (Type of *Hydrococcus Cesatii* Rabenh. in Rabenh. Alg. no. 922, D; isotypes, FC [Fig. 221], L WU). NETHERLANDS: in tropical aquarium, Hilversum, *Veldhuizen van de Wilt*, 5 Mar. 1950 (L); on *Cladophora crispata*, waterworks filter, Aarden hout near Amsterdam, *G. J. van Huesden*, 30 Jul. 1940 (FC, L). BELGIUM: in *Fontinalis squamosa* var. *tumida* submersa in rivo Ambève Arduennae, *F. Verdoorn*, Aug. 1927 (FC). GREAT BRITAIN: on *Cinclidotus fontinaloides* on stony bottom of Hellgill (Scotland), *G. Dixon*, 5 Mar. 1852 (FC); on *Cladophora glomerata* in River Coln at Fairford (Gloucester), *W. L. Tolstead* 8472, 8504, 24 Sept., 7 Oct. 1944 (FC); Baunton stream, Cirencester (Gloucester), *W. Joshua* (FC); on *Fontinalis squamosa*, Westmorland, *P. Dreesin*, 1873 (FC); on *Cladophora glomerata*, East Lyn, north Devon, *F. E. Fritsch*, 2 Sept. 1918 (Type of *Xenococcus chroococcoides* Fritsch in the collection of F. E. Fritsch; isotype, D [Fig. 242]); on *Cinclidotus fontinaloides*, Plymouth, *Holmes*, 1867 (FC). FRANCE: sur les Lemanea et sur la mousse (as *Hydrococcus Brebissonii* in Desmazières, Pl. Cryptog. Fr., ser. 2, no. 1960, NY); sur *Trichostomum fontinaloides*, in rivulis ad saxa calcarea Jurassa, *J. B. Mougeot* (FC); with *Inactis tinctoria*, Vosges, ex herb. Lenormand (D); sur *Cladophora*, Berthenicourt-par-Moy (Aisne), *J. Mabilley* 7, Aug. 1952 (FC); Vire (Calvados), *A. de Brébisson* (FC); Courteilles (Calvados), *Brébisson*, May 1839 (PC); Falaise (Calvados), *Brébisson* (Type of *Oncobyrsa Brebissonii* Menegh., L [Fig. 245]; isotypes, NY, UC); sur *Fontinalis antipyretica*, Mte. Rotondo (Corsica), *Solierol* 5035 (FC); sur *Cinclidotus fontinaloides*, moulin de Kerauffray près Guingamp (Côtes du Nord), *E. Jeanpert*, 24 Jul. 1901 (FC); sur la *Lemanea incurvata* sur une écluse de la petite Vienne, Limoges (Haute Vienne), *Lamy de la Chapelle* (FC); sur *Cinclidotus aquaticus*, St. Guilhem (Hérault), *La Perraudière*, 11 Jun. 1857 (FC); Lozère, *Duby* (L); sur *Fontinalis Camusii* dans de lit de la Sèvre-Nantaise et de la Maine à Boussey et Aigrefeuille (Loire Inférieure), *E. Bureau & F. Camus* (FC).

SPAIN: Nacimiento del Rio Grande, nahe Yunquera in Serrania de Ronda (Malaga), *H. Nilsson* 24, 28 May 1883 (Type of *Oncobyrsa hispanica* M. Lewin, S). ANGOLA: Loanda, supra *Pithophorum radiansem* in aquariis aquae subdulcis insulae Cassanga prope Morro da Cruz, *F. Welwitsch* 197, Apr. 1854 (Type of *Dermocarpa depressa* W. & G. S. West, BM; isotypes, BIRM, D [Fig. 244], FC, UC). MADAGASCAR: auf *Rhizoclonium hieroglyphicum* in Süßwasser, Nosi-bé, *J. M. Hildebrandt* 2, Sept. 1879 (FC). ICELAND: on a lake-margin above Húsavik (North Amt), *J. Boye Petersen*, 26 Jul. 1914 (Type of *Chamaesiphon cylindricus* Boye Peters. in the collection of J. Boye Petersen; isotype, D [Fig. 238]). NEW BRUNSWICK: on *Tolypothrix penicillata* in brooklet 1 mile up Little river from Grand Falls, *H. Habeeb* 10407, 14 Jul. 1948 (FC, HA). NEW HAMP-

SHIRE: on *Fontinalis antipyretica* var. *gigantea*, C. G. Pringle, 22 Jun. 1880 (FC); in a brook, Glen Road, White mountains, W. A. Setchell 364, 9 Sept. 1891 (FC, UC); on mosses in stream on west slope of Moose mountain, Hanover, L. H. Flint, 12 Aug. 1945 (FC); on *Hypnum Lescurii*, Bowls and Pitchers, Shelburne, W. G. Farlow, Oct. 1899 (FC, FH); on *Hydrobyria venosa*, Ingalls brook, Shelburne, E. Faxon, 2 Sept. 1886 (D, FH). MASSACHUSETTS: on *Lemanea fucina*, Waverley, W. H. Weston Jr., 1 Jun. 1923 (FC, TA); Gosnold pond, Cuttyhunk, I. F. Lewis & R. H. Colley, 5 Jul. 1915 (as *Chamaesiphon incrustans* in Coli., Hold., & Setch., Phyc. Bor.-Amer. no. 2101, FC, L). CONNECTICUT: on *Stigonema*, Stony brook, Montville, W. A. Setchell 102, 30 Jun. 1890 (FC, UC); Stony brook, Mohegan, Setchell, 9 Sept. 1892 (FC, UC); among *Confervae*, New Haven, W. C. Sturges, 30 May 1889 (FC, UC). QUEBEC: submergé, Rivière Payne vers 71° 5" long, O., Ungava, J. Rousseau 1175, 11 Aug. 1948 (FC); sur *Podostemon Ceratophyllum* dans les rapides près de l'Eglise, Saint Joseph, Rivière des Rapides, F. Marie-Victorin & Rolland-Germain 33998, 9 Sept. 1930 (FC). NEW YORK: on *Oedogonium* in aquarium in Barnard College, New York City, H. C. Bold B71, 1 May 1941 (FC); on *Cladophora crispata* in Green lake near Kirksville, W. R. Maxon 6048, 21 Oct. 1914 (FC, US). PENNSYLVANIA: on *C. glomerata* in Little Conestoga creek, Hempfield township, Lancaster county, R. Patrick 63, 30 Sept. 1948 (FC, PH); on *Podostemon Ceratophyllum* f. *chondroides*, Winona falls near Bushkill, Pike county, N. C. Fasset & H. H. Calvert 19488, 6 Sept. 1938 (FC).

VIRGINIA: James river, Richmond, W. E. Wade, 27 Jul. 1951 (DA); on *Fontinalis dalecarlica*, Dickey creek, Smyth county, J. K. Small S14, 17 Jun. 1892 (FC). WEST VIRGINIA: on *Audouinella violacea* on dripping rocks above Buckhannon river 5 miles below Buckhannon, Upshur county, H. K. Phinney 530, 30 Aug. 1938 (FC, PHI). NORTH CAROLINA: on *Fontinalis dalecarlica* in stream, Soco falls, Soco Gap, Jackson county, W. H. Welch 2221, 17 Jun. 1936 (FC); on *F. dalecarlica*, Montreat, Buncombe county, P. C. Standley & H. Bollman 10123, 3 Aug. 1913 (FC); near Round Bottom CCC camp, Swain county, H. Silva 200, Nov. 1941 (FC, TENN). SOUTH CAROLINA: on logs at 1st and 2nd dikes, Savannah river, Barnwell county, J. H. Wallace 64, 30 Jun. 1951 (DA). FLORIDA: Hamilton county: on *Lyngbya aestuarii*, West Lake, J. H. Davis Jr., summer 1937 (D). Hernando county: on *Rhizoclonium fontanum*, M. A. Brannon 574, 23 Oct. 1948 (FC, PC); on moss, Weekiwahee Springs, Standley 92737, 6 Mar. 1946 (FC). Jackson county: on mosses in stream on highway no. 71 five miles south of Marianna, C. S. Nielsen, G. C. Madsen, & D. Crowson 347, 31 Aug. 1948 (FC, T). Leon county: Nielsen 130, Jun. 1948 (FC, T); Little Natural Bridge sink, Nielsen 134, 136, 137, Jun. 1948 (FC, T); St. Marks river at Little Natural Bridge, Nielsen, Madsen, & Crowson 538, 30 Oct. 1948 (FC, T). Marion county: Rainbow Springs near Dunnellon, Brannon 375, 20 Oct. 1946 (FC, PC), Madsen, A. L. Pates, & M. N. Hood 1954, 27 Nov. 1949 (FC, T). Orange county: on *Plectonema Wollei* in Rock spring at Kelly Park, P. O. Schallert 2278, 1 Jun. 1951 (FC). Seminole county: on *P. Wollei*, Rock Springs, E. M. Davis, May 1939 (FH). Taylor county: on *Chantansia* in a stream 1 mile northwest of Perry, F. Drouet & Nielsen 10751, 11 Jan. 1949 (FC, T). Wakulla county: on mosses in the outlet of a large sulfur spring bathing pool about one mile north of Newport, Drouet, Crowson, & R. Thornton 11386, 25 Jan. 1949 (FC, T). ONTARIO: St. Lawrence river, Kingston, J. H. Wallace 22, Jul. 1953 (D, PH). OHIO: on *Cladophora crispata* in Plum creek at the golf course, Oberlin, P. Smith 2, 29 Oct. 1938 (FC); on *Chantansia* on rock in the Scioto river, Chillicothe, L. J. King 410, 27 Jul. 1941 (FC, EAR). TENNESSEE: Sevier county: on moss in stream, Greenbrier cove, H. Silva 418, 28 Dec. 1946 (FC, TENN); on *Desmonema Wrangellii* in Buck Fork, Silva 643, 21 Apr. 1947 (FC, TENN); muddy stream at Sugarlands camp, Silva 20, 11—16 Aug. 1941 (FC, TENN); Ramsey Prong, Silva 366, 425, 2353, 3 Nov., 29 Dec. 1946, 9 Sept. 1950 (FC, TENN). MICHIGAN: on *Fontinalis antipyretica* var. *gracilis* in a brook near Bear Lake, Manistee county, E. J. Hill 216, 23 Aug. 1880 (FC); on *Oedogonium*, Moloney lake, Cheboygan county, H. K. Phinney 79M4/5, 15 Aug. 1941 (FC, PHI). INDIANA: on *Pithophora* in pool, Evansville College, Evansville, R. K. Zuck, May 1944 (FC). WISCONSIN: on *Cladophora*, Waunona (Monona) lake, Madison, V. A. Latham, 27 Apr. 1943 (FC); on *Cladophora* in the source of the Yahara river, Tenney park, Madison, H. B. Louderback & F. Drouet 5516, 23 Jul. 1944 (FC); on moss in Weber lake, Vilas county, G. W. Prescott 3W104, 21 Aug. 1938 (FC). ILLINOIS: on *Cladophora* in small stream, Biltmore subdivision near Barrington, P. C. Standley 92845, 19 May 1946 (FC); on *Pithophora oedogonia* in laboratory culture, Chicago Natural History Museum, Chicago, F. A. Barkley 151117, 24 Aug. 1945 (FC).

MINNESOTA: on *Lemanea torulosa*, Lester river, Duluth, E. Butler, Aug. 1902 (FC, FH); Mary lake and La Salle creek, Itasca state park, Drouet 12172, K. C. Fan 10146, 1954 (D). MISSOURI: on *Rhizoclonium hieroglyphicum* in Lake Hahatonka, Camden county, Drouet 145, 9 Aug. 1928 (D); on *R. hieroglyphicum*, Chouteau Springs, Cooper county, Drouet & Louderback 5648, 25 Aug. 1945 (FC); on *Fontinalis* in Fishing spring beside Meramec river 2 miles northwest of Steelville, Crawford county, J. A. Steyermark 41394, 16 Jun. 1941 (FC); Gravois spring, Gravois Mills, Morgan county, Drouet 682, 882, 7 Sept. 1930, 3 May 1931 (D); on *Rhizoclonium hieroglyphicum* in the creek below Roubidoux spring, Waynesville, Pulaski county, Drouet 599, 18 May 1930 (D). ARKANSAS: on *R. hieroglyphicum* in Saline river, Warren, Bradley county,

D. Demaree 24811, 24817, 23 Oct. 1943 (FC). LOUISIANA: in tank by Engineering laboratories, Louisiana State University, Baton Rouge, L. H. Flint 5, 18 Apr. 1945 (FC). NEBRASKA: on *R. hieroglyphicum* in culture from floodplain pond, Platte river south of Kearney, Buffalo county, W. Kiener 16496d, 6 Nov. 1945 (FC, KI); on *Cladophora glomerata* in Little Bordeaux creek near Chadron, Dawes county, Kiener 20570, 22 May 1946 (FC, KI); on *Cladophora* in floodplain creek, Platte river near Sutherland, Lincoln county, Kiener 14875, 1 Aug. 1943 (FC, KI); on *Cladophora* in culture from Pawnee slough 9 miles east of North Platte, Kiener 16451a, 16 Jul. 1944 (FC, KI); on *C. crispata* in drainage ditch, Northport, Morrill county, W. Kiener 23056, 4 Mar. 1948 (FC, KI); on *Basidiocladia Chelonum* on snapping turtle, 3 miles north of Henry, Sioux county, Kiener 23524, 11 May 1948 (FC, KI). TEXAS: swift stream at New Braunfels, L. H. Flint 4, 18 Nov. 1954 (D); Barton spring southwest of Austin, E. M. Harper & F. A. Barkley 13229, 23 Jul. 1943 (FC, TEX), B. C. Tharp & Barkley 44alg11, 5 Aug. 1944 (FC, TEX); on *Pithophora oedogonia* in Tucker lake, Brownsville, R. Runyon 3865, 18 Nov. 1944 (FC); on *Plectonema Wollei* in the head of the San Marcos river, Hays county, C. M. Rowell & Barkley 16T469, 2 Aug. 1946 (FC, TEX); on *Vaucheria* in running water, San Marcos, G. L. Fisher 49233, 24 Apr. 1949 (FC); on *Pithophora* in stream at sulphur spring, Palmetto state park near Gonzales, B. F. Plummer & Barkley VII, 22 May 1943 (FC, TEX); on *Cladophora glomerata*, Tunis Springs, about 20 miles east of Fort Stockton, Pecos county, E. Whitehouse 25153, 10 May 1951 (FC). MONTANA: on *Cladophora crispata* between Bowman lake and Mount Chapman, northwestern part of Glacier national park, C. E. Fix, Aug. 1949 (FC).

WYOMING: on *Scytonema* and mosses in creek near Emerald pool, Upper geyser basin, Yellowstone national park, W. A. Setchell 1958a, 6138, 28 Aug. 1898, 29 Jul. 1905 (FC, UC); on *Vaucheria* etc. in stream in an open meadow above University Camp, Medicine Bow national forest, W. G. Solheim 53, 27 Jun. 1933 (Type of *Dermocarpa Solheimii* Dr., FC), Solheim 108, 11 Jul. 1933 (FC). COLORADO: in shallow pool, Longs Peak, W. Kiener 161, 16 Sept. 1933 (FC, KI); on *Fontinalis antipyretica* in Cabin creek, Longs valley, Kiener 4696, 13 Oct. 1935 (FC, KI); in Alpine brook, Longs Peak valley, Kiener 13126, 20 Sept. 1941 (FC, KI). NEW MEXICO: on a liverwort in a small stream in the mountains near Santa Fe, J. B. Routien, Aug. 1945 (FC). IDAHO: on *Hygrohypnum Besii* in Adair creek, Custer district, Custer county, F. A. Mac Fadden 18707, 7 Aug. 1941 (FC); on hepatic with *Fontinalis antipyretica*, Little creek bridge, road from Deer Park to Idaho City, Mac Fadden 19297, 18 Oct. 1942 (FC). UTAH: on *Lemanea fucina* in small stream near head of small canyon above Brighton, Salt Lake county, Prof. Vorhies, Aug. 1910 (FC, UC); on *Vaucheria*, Twin creeks, Fish lake, Sevier county, S. Wright, 20 Aug. 1938 (FC). ARIZONA: on Chantrencia, Fiftyfoot falls, Havasupai canyon, Coconino county, E. U. Clover, 1 Aug. 1940 (FC, MICH). NEVADA: on *Plectonema Wollei*, Rogers Spring, Lake Mead, Clark county, R. Sumner 1614, 12 Jul. 1952 (FC). ALASKA: on mosses in brook near Iliuliuk, Unalaska, W. A. Setchell & A. A. Lawson 5036, 9 Jun. 1899 (FC, UC). OREGON: on *Aneura pinnatifida*, Salem, E. Hall, 1871 (FC). CALIFORNIA: Alameda county: on *Cladophora* in laboratory cultures, University of California, Berkeley, N. L. Gardner 3200, 3216, Jan. 1915, 1916 (FC, UC); on *Oedogonium* in an aquarium in the courtyard of the Life Sciences building, Berkeley, Gardner 8012, 28 Nov. 1936 (FC, UC); on *Cladophora* in a fountain, campus, University of California, Berkeley, Gardner, Oct. 1905 (as *Chamaesiphon confervicola* in Coll., Hold., & Setch., Phyc. Bor.-Amer. no. 1705, FC, L, TA). Inyo county: on *Plectonema Wollei*, Furnace creek, Death valley, S. B. Parish 10465, 16 May 1915 (UC). Los Angeles county: Old El Encino hot springs, B. C. Templeton 1, Jul. 1944 (FC). Marin county: on moss in rapidly running stream, Mill Valley, Gardner 1785, 21 Jul. 1906 (FC, UC); laboratory culture from Tiburon (collected by H. E. Parks), Gardner 6916, 16 Oct. 1931 (Type of *Dermocarpa minuta* Dr., FC; isotype, UC). San Bernardino county: on *Rhizoclonium* in small pond at Old Woman Springs, Mojave desert, G. J. Hollenberg 2084, 2 May 1937 (Type of *Dermocarpa Hollenbergii* Dr., D [Fig. 235]). Shasta county: Pittsville bridge, Pitt river, H. W. Shepherd 7975, 15 Aug. 1936 (FC, UC). Tulare county: on *Desmonema Wrangelii* in Marble Rock creek, Sequoia national park, R. Prentyman, 30 Jul. 1938 (FC).

PUERTO RICO: Coamo, in den warmen Quellen von los Baños, P. Sintonis A42, 23 Dec. 1885 (topotype and paratype of *Chamaesiphon incrustans* f. *minor* Möb., MO, FC); Little Springs, Minillas, Mayaguez, L. R. Almodovar 199, 27 Jul. 1954 (D, T); in a ditch by the hot spring, Coamo Springs, N. Wille 396, Jan. 1915 (Type of *C. portoricensis* Gardn., NY [Fig. 243]; isotypes, FH, UC) on *Plectonema Wollei* in river 5 km. east of Coamo, Wille 221a, Jan. 1915 (Type of *Xenococcus Willei* Gardn., NY [Fig. 236]); in Tümpel, Jayuya, Wille 1757, 15 Mar. 1915 (FC, NY); in a pool about 4 km. north of Mayaguez, Wille 1323b (Type of *Pleurocapsa epiphytica* Gardn., NY), 1323x (NY), Feb. 1915. JAMAICA: on Chantrencia, Seaman's Valley, Portland, W. R. Maxon & E. P. Killip 27, 14 Feb. 1920 (FC); on *Pithophora oedogonia*, Salt river, St. Catherine, C. B. Lewis A1236a, 17 Jul. 1950 (FC). MEXICO: on *Plectonema Wollei*, Riito de Santa Rosa, Coahuila, A. Schott 28, Nov. 1852 (FC); on moss, waterfall, Barranca de Oblatos, Guadalupe, W. Kiener 18130, 21 Dec. 1944 (FC, KI); on turtle in a pool near the bridge, Unión, Hermosillo, Sonora, F. Drouet & Richards 3020, 24 Nov. 1939 (FC). GUATEMALA: on *Cladophora* in small stream, Quebrada Shusho above Chiquimula, P. C. Standley 71933, 22 Apr. 1939 (FC); on *C. crispata* in stream,

Rio Guacalate, dept. Escuintla, *Standley* 60142, 16 Dec. 1938 (FC); on *Cladophora*, *Marathrum foeniculaceum*, and *Tristicha hypnoides*, vicinity of Santa María de Jesús, dept. Quezaltenango, *Standley* 87046, 12 Feb. 1941 (FC), *J. A. Steyermark & A. E. Vatter* 33240, 33363, 33368, 33576, 31 Dec. 1939, 1—5 Jan. 1940 (FC); on *T. hypnoides* on rocks in river, Retalhuleu, *Standley* 88817, Feb.—Mar. 1941 (FC); on *Marathrum* in Rio Lima, Mazatenango, *W. C. Muenschler* 12035, 4 May 1937 (FC); on *Oedogonium* in small stream, Zacapa, *Standley* 74268, Oct. 1940 (FC). COSTA RICA: on *Marathrum Schiedeanum* in stream, San José, *Standley* 41213, Dec. 1925—Feb. 1926 (FC). PANAMA: on *Chantransia* in stream bed, Shannon trail, Barro Colorado island, Canal Zone, *G. W. Prescott* CZ46, Aug. 1939 (FC). VENEZUELA: on mosses in stream along Rio Karuai at base of Sororopán-tepui west of La Laja, Bolivar, *Steyermark* 60774, 29 Nov. 1944 (FC). BRAZIL: on *Oedogonium* and *Pithophora* in jars of fish in the biology laboratory, Baptist College, Rio de Janeiro, *E. C. Jennings* 21, 22, 10 Aug. 1935 (D); sur *Lophogyne arcuifera*, Rio Bengala entre le Alto et Novo Friburgo (état de Rio de Janeiro), *A. Glaziov* 13147, 10 Aug. 1881 (FC). PARAGUAY: on *Chantransia*, Colonia Risso, *G. A. Malme* 92, 94B, 14 & 18 Oct. 1893 (FC, S). ARGENTINA: in *Rhizoclonium hieroglyphicum* in aqua subsalsa, Laguna Colorado, prov. Jujuy, *R. E. Pries* 26 (S). PATAGONIA (Chile?): Rio & Sierra Bagnales, *O. Borge* 365, 367, Mar. 1899 (S); Kark, *Borge* 383, Mar. 1899 (S). PERU: sobre *Pithophora oedogonia*, Salaverri, Trujillo, *N. Ibañez H. "P"*, 18 May 1952 (FC); on *Rhynchostegium aquaticum* in irrigation ditch, Santa Eulalia, Chosica, *G. S. Bryan* 9a, 11—13 Mar. 1923 (FC); on *Rhizoclonium hieroglyphicum*, head of Mogollon quebrada in the Amotape mountains, prov. Paita, dept. Piura, *C. C. Sanborn*, Sept. 1943 (FC).

HAWAIIAN ISLANDS: Hawaii: on *Pithophora*, Punaluu, *J. E. Tilden*, 3 Jul. 1900 (FC), *M. Dory* 8004, 9 Sept. 1950 (FC). Kauai: on *Cladophora crispata* in a brook, Kumuela camp, *M. Reed*, 21 Jul. 1908 (FC, UC). Oahu: in *Cladophora longiarticulata* in piscinis in convalle Nuanu prope Honolulu, *S. Berggren*, 1875 (Types of *Chamaesiphon curvatus* Nordst. and *f. elongatus* Nordst., PC; isotypes on *Cladophora longiarticulata* in Witttr. & Nordst., Alg. Exs. no. 213, FC, MN); on *Pithophora oedogonia* in a fishpond, Peninsula, Pearl City, *Tilden*, 6 Jun. 1900 (FC). CAROLINE ISLANDS: on *P. oedogonia* in Sapalap river, Sapalap, Metalanum dist., Ponape, *S. F. Glassman* 2763, 2 Aug. 1949 (FC). SAMOA ISLANDS: Savaii, Flussbette, *K. H. Rechinger* 2969, Jul. 1905 (Type of *Chroococcus turgidus* var. *subvulaceus* Wille in the slide collection of N. Wille, O); Upolu, *Rechinger* 3165, 25 Jun. 1905 (Type of *C. varius* f. *samoensis* Wille in the slide collection of N. Wille, O). NEW ZEALAND: *S. Berggren* 145 (PC); Taupo lake, *Berggren* 146, 1875 (L, S); Roto-a-lake, *Berggren* 267, 1876 (S); in *Cladophoris* in Tokano river, *Berggren* 319b, Jan. 1875 (as *Sphaerogonium incrustans* and "*Xenococcus?* vel *Oncobyrsa?*" in Witttr. & Nordst., Alg. Exs. no. 899, FC, L, NY, PC, S, UC); on *Cladophora glomerata* in cold stream, Wairakei geyser valley, Taupo county, *W. A. Setchell* 5967(58), 5 May 1904 (FC, UC); Whakarewarewa, Rotorua, *J. E. Tilden*, Nov. 1909 (as *Gloeocapsa gelatinosa cryptococcoides* in Tild., So. Pacific Alg. no. 2, L, N, UC). PHILIPPINES: on *Plectonema Wollei*, waterfall at Bisayaan, Puerto Galera, Mindoro, *G. T. Velasquez* 1518, 12 Apr. 1948 (FC, PUH); on *P. Wollei* in swimming pool, Pansol, Calamba, Laguna, *Velasquez* 464, 25 Feb. 1940 (FC). CHINA: small pond, Nine-Old-Men Cave, Omei, Szechwan, *H. Chu* 1354, 23 Aug. 1942 (FC). INDONESIA: Java: auf Moosen im fliessenden Wasser, Quelle bei Kandang Badak, Gebiet von Tjibodas, *Ruttner*, 12 Jul. 1929 (Type of *Chamaesiphon mollis* Geitl., slide no. TJ5b in the collection of L. Geitler; cotype, slide no. TJ5c in coll. L. Geitler); auf *Oedogonium* an riefender Wand, Wasserfälle von Tjibereum, Gebiet von Tjibodas, *Ruttner*, 9 Jul. 1929 (Type of *Chamaesiphon subglobosus* var. *major* Geitl., slide no. TJ2lac in the slide collection of L. Geitler); auf Lyngbya aus 5 m. Tiefe, Ranu Bedali, *Ruttner*, Nov. 1928 (Type of *Dermocarpa clavata* Geitl., slide no. KB28 in the collection of L. Geitler; Type of *D. xenococcoides* Geitl., slide no. KB28 in the collection of L. Geitler); Tengger, *Ruttner*, 25 Jun. 1929 (slide no. TG1d in the collection of L. Geitler). Sumatra: Dana Manindjau, *Ruttner*, 1929 (paratype of *Xenococcus minimus* var. *Starmachii* Geitl., slide no. FM2bα in the slide collection of L. Geitler); auf *Cladophoraceae*, von Strauchwerk tief beschattete Stelle am Ufer, Hauptzufluss des Ranau-Sees bei Kota Batu, *Ruttner* (Type of *Pleurocapsa subgelatinosa* Geitl., slide no. RE3αα in the collection of L. Geitler); auf *Hydrella* aus 7 m. Tiefe, Profil vor Panjingahan am Westufer des Singkarak-Sees, *Ruttner*, 22 Feb.—15 Mar. 1929 (Type of *Chamaesiphon minutus* var. *gracilior* Geitl., slide no. SK4d in the collection of L. Geitler); auf *Cladophoraceae*, Stromgebiet der Musi, Suban Ajer Panas, *Ruttner*, 7 May 1929 (slide no. M4gβ in the collection of L. Geitler). WESTERN TIBET: stream just below Phobrang, running into northwest end of Pang-gong Tso, *G. E. Hutchinson* L46, 8 Jul. 1932 (D, FH, L, NY, YU). INDIA: on *Oedogonium* in the Jumna, Allahabad, *P. Maheshwari* 99, 138, Apr. 1938 (FC).

5b. ENTOPHYSALIS LEMANIAE f. ELONGATA (Wille) Drouet & Daily, COMB. NOV. *Chamaesiphon gracilis* f. *elongatus* Wille, Bih. t. K. Sv. Vet.-Akad. Handl. 8(18): 28. 1884. *Entophysalis elongata* Drouet & Daily, Butler Univ. Bot. Stud. 10: 223. 1952. —Type from Nova Zembla (S). FIG. 246.

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Chamaesiphon macer Geitler, Arch. f. Protistenk. 51: 331. 1925.

Chamaesiphon curvatus f. *polysporinus* Schirshov, Acta Inst. Bot. Acad. Sci. U. R. P. S. S., ser. 2, Pl. Crypt. 1: 81. 1933.

Chamaesiphon cylindrosporus Skuja, Symbolae Bot. Upsal. 9(3): 45. 1948.

Cellulae solitariae primum sphaericae aetate provecta lineari-cylindricae vel lineari-tubaeformes, pulvinis et endosporangiis quaerendis. FIG. 246.

On larger, chiefly perennial, algae and other plants in clear freshwater streams and lakes. The well developed solitary cells have the general aspect of plants of *Lyngbya versicolor* (Wartm.) Gom. and *L. Diguetii* Gom. *Crenothrix polyspora* Cohn may sometimes be confused with this form.

Specimens examined:

NOVA ZEMBLA: Norra Gäskap, F. Kjellman 29b, 1875 (Type of *Chamaesiphon gracilis* f. *elongatus* Wille, S [Fig. 246]). NORWAY: Olden in Nordfjord, O. Nordstedt, 17 Aug. 1878 (PC). SWEDEN: in *Fontinalis dalecarlica*, Kvarnbaacken, Högsjö, Angermanland, A. Arvén, 14 Jul. 1914 (FC). MASSACHUSETTS: with *Chantrelaria Hermannii* on mosses in brook, Sharon, F. S. Collins, May 1890 (in Collins, N. Amer. Alg. 153, D), Massapoag brook, Sharon, W. A. Seisbell 26, 4 May 1890 (D). QUEBEC: sur les mousses au bord de la Rivière Payne, vers 73° 7' long. O., Ungava, J. Rousseau 937, 6 Aug. 1938 (FC). LOUISIANA: stream near Husser, Tangipahoa parish, L. H. Flint, 21 Mar. 1953 (FC).

FAMILY III. CLASTIDIACEAE

Drouet & Daily, Butler Univ. Bot. Stud. 10: 223. 1952. —Type genus: *Clastidium* Kirchn.

Plantae microscopicae, solitariae, epiphyticae, primum sphaericae aetate provecta cylindricae, basim affixae, primum unicellulares demum interne in catenam cellularum sphaericarum, ovoidearum, vel cylindricarum uniseriatim (raro parce pauciseriatim) dividentes; vagina tenue, ad apicem clausa, ad basem incrassata, ad substratum adhaerente; reproductione a dissolutione vaginae demum catenae cellularum.

Plants of this family are elongate epiphytic unicells contained in thin gelatinous sheaths. The entire protoplast divides into a uniseriate (rarely few-seriate in part) chain of rounded cells which often remain united by their membranes after the hydrolyzation of the sheath. The cells, upon separation from each other, elongate and secrete new gelatinous sheaths.

Key to genera:

- Plant terminating above in a hair-like extension of the sheath 1. CLASTIDIUM
Plant smooth at the apex 2. STICHOSIPHON

GENUS I. CLASTIDIUM

Kirchner, Jahresh. Ver. Vaterl. Naturk. Württemberg 36: 195. 1880. —Type species: *C. setigerum* Kirchn.

Plantae microscopicae, solitariae, erectae, epiphyticae, primum sphaericae aetate provecta cylindricae, basim affixae, unicellulares demum interne in catenam

cellularum sphaearicarum uniseriatim dividentes, vagina tenue, ad apicem clausa et in setam producta, ad basem incrassata et ad substratum adhaerente.

One species:

CLASTIDIUM SETIGERUM Kirchner, Jahresh. Ver. Vaterl. Naturk. Württemb. 36: 195. 1880. —Specimen presumably seen by the author from Malmagen in Herjedalia, Sweden (MIN), designated as the Type. Specimens from Bessvatn, Sweden (DA), photographed: FIGS. 251, 252.

Plantae microscopicae, aerugineae, solitariae, erectae, primum sphaericae aetate provecta cylindricae, diametro 2—5 μ crassae, ad 15 (—38) μ altae, ad apicem acutae vel rotundae, basim affixae, primum unicellulares demum interne in catenam cellularum sphaearicarum uniseriatam dividentes, vagina hyalina tenue, ad apicem clausa et in setam producta, ad substratum adhaerente; protoplasmate aerugineo, homoganeo. FIGS. 251, 252.

Epiphytic on larger algae, mosses, etc. in freshwater lakes, ponds, bogs, and streams. This species has been confused with solitary cells of *Entophysis Lemaniae*, *Characium* spp., and *Characiopsis* spp., also with young filaments of *Amphithrix janthina* (Mont.) Born. & Flah., *Lyngbya versicolor* (Wartm.) Gom., and various bacteria.

Specimens examined:

SWEDEN: ad folia emortua Fontinalis in amne ad Malmagen in Herjedalia, G. Lagerheim, 28 Jul. 1897 (designated as Type of *Clastidium setigerum* Kirchn. in Witt., Nordst., & Lagerh., Alg. Exs. no. 1536, MIN); on Dichothrix, Bessvatn, K. Thomasson, 18 Jul. 1951 (DA [Figs. 251, 252]). MISSISSIPPI: on Chantrya in swift water, stream between Cheraw and Sandy Hook, Marion county, L. H. Flint, 11 Oct. 1946 (FC). LOUISIANA: in a stream near Blond, St. Tammany parish, Flint, 7 Mar. 1953 (FC). ALASKA: Karluk lake, Kodiak, D. Hilliard 11, 1955 (D).

GENUS 2. STICHOSIPHON

Geitler, Rabenh. Krypt.-Fl. 14: 411. 1931. —Type species: *S. regularis* Geitl.

Plantae microscopicae, solitariae, erectae vel curvatae, epiphyticae, initio sphaericae aetate provecta cylindricae, basim affixae, primum unicellulares demum interne in catenam cellularum sphaearicarum, ovoidearum, vel cylindricarum uniseriatam (vel raro parce pauci-seriatam) dividentes, vagina tenue, ad apicem clausa et rotunda, ad basem incrassata et ad substratum adhaerente.

One species:

STICHOSIPHON SANSIBARICUS Drouet & Daily, Butler Univ. Bot. Stud. 10: 223. 1952. *Chamaesiphon sansibaricus* Hieronymus in Engler, Pflanzenwelt Ostafri. C: 8. 1895. —Type from Zanzibar (BM). FIG. 253.

Chamaesiphon filamentosus Ghose, Journ. Linn. Soc. Bot. 46: 337. 1924. *Stichosiphon filamentosus* Geitler, Rabenh. Krypt.-Fl. Eur. 14: 411. 1932. —Type from Lahore, Pakistan (in the collection of F. E. Fritsch). FIG. 254.

Chamaesiphon Willei Gardner, Mem. New York Bot. Gard. 7: 34. 1927. —Type from Rio Piedras, Puerto Rico (NY).

Stichosiphon regularis Geitler, Rabenh. Krypt.-Fl. 14: 411. 1932. —Type from Lake Ranau Bedali, east Java, Indonesia (in the collection of L. Geitler).

Original specimens have not been available to us for the following names; their original descriptions are here designated as the Types until the specimens can be found:

Stichosiphon indicus B. Rao, Proc. Indian Acad. Sci. 3: 167. 1936.

Dermocarpa olivacea var. *gigantea* B. Rao, Proc. Indian Acad. Sci. 3: 167. 1936.

Plantae microscopicae, aerugineae, olivaceae, violaceae, vel roseae, solitariae, erectae vel varie curvatae, epiphyticae, initio sphaericae aetate provecta cylindricae, diametro 3—7 μ crassae, ad 400 μ altae, primum unicellulares demum interne in catenam cellularum sphaearicarum, ovoidearum, vel cylindricarum uniseriatam (vel raro parce pauci-seriatam) dividentes, vagina hyalina tenue, ad apicem rotunda, primum clausa deinde aperta, ad basem incrassata saepe brevi-stipitata, ad substratum adhaerente; protoplasmate aerugineo, olivaceo, violaceo, vel roseo, homoganeo. FIGS. 253, 254.

Epiphytic on larger algae and other plants in freshwater lakes, ponds, and streams. Well developed plants of *Stichosiphon sansibaricus* are reminiscent in habit of young filaments of *Anabaena* and *Calothrix* spp. Smaller plants can be confused with large solitary cells of *Entophysalis Lemaniae*.

Specimens examined:

ZANZIBAR: auf Cladophora an einer undichten Stelle der Wasserleitung etwas nördlich der Stadt Sansibar, Stuhlmann 21, 31 May 1891 (Type of *Chamaesiphon sansibaricus* Hieron., BM [Fig. 253]). VIRGINIA: James river, Richmond, W. E. Wade, Jul. 1951 (DA). FLORIDA: on *Plectonema Wollei* and *Rhizoclonium hieroglyphicum*, Rock Springs, Seminole county, E. M. Davis, 1939 (FH); on Cladophora in the spring-pool, Wakulla Springs, Wakulla county, F. Drouet, G. Madsen, & D. Crowson 11506, 27 Jan. 1949 (FC, T); on *Plectonema Wollei* and *Rhizoclonium fontanum* in wet place at Rock Spring Park, Orange county, P. O. Schallert 2300, 1 Jun. 1951 (FC). TENNESSEE: on *R. hieroglyphicum*, Cumberland river at Clarksville, Montgomery county, A. E. Clebsch 2023, 1 Oct. 1949 (FC, TENN); on Pithophora in Blue Basin, Reelfoot lake, Lake county, H. Silva 1156, 2 Jul. 1949 (FC, TENN). ARKANSAS: on *Rhizoclonium hieroglyphicum* in Buffalo river, St. Joe, Searcy county, D. Demaree 25307Aa, 1 Oct. 1944 (FC). PUERTO RICO: on Oedogonium in a reservoir, Rio Piedras, N. Wille 119b, Dec. 1914 (Type of *Chamaesiphon Willei* Gardn., NY; isotypes, FH, UC). PHILIPPINES: Los Baños, Laguna, E. Quisumbing 5434, 13 Oct. 1929 (FC, UC); on Cladophora in little spring at base of Igkaras hill, Alimodian, Iloilo, J. D. Soriano 1538, 7 Dec. 1952 (FC, PUH). CHINA: on *Plectonema Wollei*, Wuhsien (Soochow), Kiangsu, C. C. Wang 312, 14 Oct. 1930 (FC, UC). INDONESIA: auf Lyngbya aus 3.6 m. Tiefe, Ranau Bedali-See, Ost-Java, Ruttner, 20—22 Nov. 1928 (Type of *Stichosiphon regularis* Geitl., slide no. KB2 β in slide collection of L. Geitler). INDIA: on Oedogonium, McPherson lake, Allahabad, P. Maheshwari 21, Jul. 1939 (FH). PAKISTAN: on Pithophora in a stagnant pool in the Botanical Gardens, Lahore, Ghose, 13 Oct. 1918 (Type of *Chamaesiphon filamentosus* Ghose in the collection of F. E. Fritsch; isotype, D [Fig. 254]).

NOMINA EXCLUDENDA

The following names have been described on the bases of material not included in the families treated above. Most of these names were originally described as members of the Chroococcaceae, Chamaesiphonaceae, or Clastidiaceae; or were transferred into those families at one time or another; or have been suspected as being members of those families. Where the original specimens have not been available for study, we have designated the original description as the temporary Type, to serve until specimens seen by the author can be found.

The alga most frequently mistaken as one of the coccoid Myxophyceae is that classically referred to in the literature since 1849 as one or another species of *Gloeocystis*. In this study we could not obviate special efforts to understand the large numbers of specimens of this group from all parts of the world that have come to our attention. The genus and its single species are therefore treated here separately:

PALMOGLOEA Kützing, Phyc. Gener., p. 176. 1843. —Type species: *Ulva protuberans* Sm. & Sowerb., 1814.

Bromicolla Eichwald, Förh. Skandinav. Naturforsk., 3rd Möte, Stockholm (13—19 Juli 1842), p. 615. 1843. —Type species: *B. aleutica* Eichw., 1843.

Brachia Trevisan, Sagg. Monogr. Alg. Coccot., p. 57. 1848. —Type species: *Palmella crassa* Nacc., 1828.

Hassallia Trevisan, Sagg. Monogr. Alg. Coccot., p. 67. 1848. —Type species: *Haematococcus Hookerianus* Berk. & Hass., 1845.

Urococcus Hassall ex Kützing, Sp. Algar., p. 206. 1849. *Haematococcus* Subgenus *Ourococcus* Hassall, Hist. Brit. Freshw. Alg., p. 322. 1845. —Type species: *Haematococcus Allmanii* Hass., 1845.

Aphanocapsa Nägeli, Gatt. Einzell. Alg., p. 52. 1849. *Microcystis* Subgenus *Capsithece* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 67. 1923. —Type species: *Palmella parietina* Nägeli, 1849.

Dactylothece Lagerheim, Öfers. K. Sv. Vet.-Akad. Förh. 40(2): 64. 1883. —Type species: *D. Braunii* Lagerh., 1883.

Rhodococcus Hansgirg in Wittrock & Nordstedt, Alg. Exs. 14: 697. 1884; in Wittrock & Nordstedt, Bot. Notiser 1884: 128. 1884; Oesterr. Bot. Zeitschr. 34: 314. 1884. *Chroococcus* Subgenus *Rhodococcus* Hansgirg, Prodr. Algenfl. Böhmen 2: 159. 1892. —Type species: *Rhodococcus caldarium* Hansg., 1884.

Gloeotheca Sectio *Hyalotheca* Kirchner in Engler & Prantl, ed. 1, 1(1a): 55. 1898. *Gloeotheca* Subgenus *Hyalotheca* Kirchner ex Forti, Syll. Myxophyc., 60. 1907. —Type species: *Gloeocapsa palea* Kütz., 1843.

The following names are interpreted only on the bases of descriptions of their respective Type species:

Gloeocystis Nägeli, Gatt. Einzell. Alg., p. 65. 1849. —Type species: *G. vesiculosa* Näg., 1848. *Cyanostylon* Geitler, Arch. f. Protistenk. 60: 441. 1928. —Type species: *C. microcystoides* Geitl., 1928.

Vanhoeffenia Wille, Deutsche Südpolar-Exped., 1901—03, 8: 422. 1928. —Type species: *V. antarctica* Wille, 1928.

Hormotheca Jao, Sinensia 15: 77. 1944. —Type species: *H. rupestris* Jao, 1944.

Stillocapsa Ley, Bot. Bull. Acad. Sinica 1: 77. 1947. —Type species: *S. sinica* Ley, 1947.

Asterocapsa Chu, Ohio Journ. Sci. 52(2): 97. 1952. —Type species: *A. gloeotheciformis* Chu, 1952.

Plantae pauci- vel multicellulares, in strata vel pulvina increscentes, cellulis in divisione transversale primum hemisphaericis vel hemi-ellipsoideis, aetate provecta sphaericis, ovoideis, vel quasi-fusiformibus, per gelatinum vaginale irregulariter vel regulariter (nonnumquam uniseriatim) distributis; chloroplastidibus viridibus, irregulariter poculiformibus, parietalibus, solitariis, sine pyrenoideis; gelatino vaginale homoganeo vel lamelloso; reproductione a fragmentatione vel a zoosporis chlamydomonadoideis [?].

One species:

PALMOGLOEA PROTUBERANS (Sm. & Sow.) Kützing, Phyc. Gener., p. 176. 1843; Kützing, Linnaea 17: 85. 1843. *Ulva protuberans* Smith & Sowerby, Engl. Bot. 36: 2583. 1814. *Merrettia protuberans* S. F. Gray, Nat. Arr. Brit. Pl., p. 349. 1821. *Palmella protuberans* Greville, Fl. Edin., p. 323. 1824; Agardh, Syst. Algar., p. 14. 1824. *Coccochloris protuberans* Sprengel, Linn. Syst. Veget., ed. 16, 4(1): 373. 1827. —Type from Sussex, England: Uckfield, W. Borrer (BM).

Chaos bituminosus Bory, Dict. Class. d'Hist. Nat. 3: 16, 1823. *Palmella bituminosa* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5(Sci. Fis. & Mat.): 46, 56. 1843. *Protococcus bituminosus* Kützing, Tab. Phyc. 1: 4. 1846. *Pleurococcus bituminosus* Trevisan, Sagg. Monogr. Alg. Coccot., p. 32. 1848. *Gloeocapsa bituminosa* Kützing, Sp. Algar., p. 224. 1849. *Chroococcus bituminosus* Hansgirg, Oesterr. Bot. Zeitschr. 35: 116. 1885; Bot. Centralbl. 22: 25, 27. 1885. —Designated Type from France: sur les pierres calcaires de l'entrée des carrières de St-Leu sous le camp de Cesar, Bory de St-Vincent, Oct. 1815 (PC).

Palmella crassa Naccari, Algol. Adriat., p. 12. 1828; Fl. Veneta 6: 41. 1828. *Coccochloris crassa*

Meneghini in Zanardini, Bibl. Ital. 99: 197. 1840. *Brachia crassa* Trevisan, Sagg. Monogr. Alg. Coccot., p. 57. 1848. *Palmophyllum crassum* Rabenhorst, Fl. Eur. Algar. 3: 49. 1868. —Paratype, here designated as the Type, from Istria: in Adriatico nella acqua del Golfo nominato Quarnero, ex Naccari, 1833 (PC). FIG. 289.

Palmella Grevillei Berkeley, Glean. Brit. Alg., p. 16. 1833. *Botrydina Grevillei* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 47. 1843. *Botrydiopsis Grevillei* Trevisan, Nomencl. Algar. 1: 70. 1845. *Coccochloris Grevillei* Hassall, Hist. Brit. Fresh-w. Alg. 1: 318. 1845. *Pleococcus Grevillei* Trevisan, Sagg. Monogr. Alg. Coccot., p. 43. 1848. *Anacystis Grevillei* Kützing, Sp. Algar., p. 209. 1849. *Aphanocapsa Grevillei* Rabenhorst, Fl. Eur. Algar. 2: 50. 1865. *Palmogloea Grevillei* Crouan fr., Fl. Finistère, p. 110. 1867. *Microcystis Grevillei* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 126. 1938. *Gloeocystis Grevillei* Drouet & Daily, Lloydia 11: 79. 1948. —Type from Scotland: Kinnordy Moss, R. K. Greville (E); isotype, K. Both specimens are largely parasitized, but enough unparasitized material is present to indicate clearly the nature of the alga. FIG. 274.

Palmella furfuracea Berkeley, Glean. Brit. Alg., p. 18. 1833. *Anacystis furfuracea* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 47, 94. 1843. *Botrydiopsis furfuracea* Trevisan, Nomencl. Algar. 1: 41. 1845. *Haematococcus furfuraceus* Hassall, Hist. Brit. Fresh-w. Alg. 1: 331. 1845. *Bichatia furfuracea* Trevisan, Sagg. Monogr. Alg. Coccot., p. 65. 1848. —Type from England: Milton, herb. Berkeley (K).

Palmella granosa Berkeley, Glean. Brit. Alg., p. 19. 1833. *Haematococcus granosus* Harvey, Man. Brit. Alg., p. 181. 1841. *Microcystis granosa* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 47, 85. 1843. *Bichatia granosa* Trevisan, Nomencl. Algar. 1: 60. 1845. *Gloeocapsa granosa* Kützing, Tab. Phyc. 1: 25. 1846. *Microcystis granulosa* Meneghini ex Rabenhorst, Fl. Eur. Algar. 2: 61. 1865. *Gloeotheca granosa* Rabenhorst, loc. cit. 1865. —Type from England: "Palmella granosa", herb. Berkeley (K). This specimen is chiefly composed of *Palmogloea protuberans* through which are distributed the cysts of Dinoflagellates.

Palmella grumosa Carmichael in Hooker, Engl. Fl. 5(1) [Brit. Fl. 2]: 397. 1833. *Sorospora grumosa* Hassall, Hist. Brit. Fresh-w. Alg. 1: 310. 1845. *Bichatia grumosa* Trevisan, Sagg. Monogr. Alg. Coccot., p. 60. 1848. —Type from Great Britain: "Palmella grumosa", Carmichael (K).

Palmella hyalina β *musciicola* Carmichael in Hooker, Engl. Fl. 5(1) [Brit. Fl. 2]: 397. 1833. *P. hyalina* var. *musciicola* Harvey ex Trevisan, Sagg. Monogr. Alg. Coccot., p. 56. 1848. *Coccochloris muscorum* Brébisson pro synonym. ex Trevisan, loc. cit. 1848. —Type from Great Britain: Carmichael (K). FIG. 298.

Palmella rivularis Carmichael in Hooker, Engl. Fl. 5(1) [Brit. Fl. 2]: 397. 1833. *Coccochloris rivularis* Hassall, Hist. Brit. Fresh-w. Alg. 1: 317. 1845. *Bichatia rivularis* Trevisan, Sagg. Monogr. Alg. Coccot., p. 66. 1848. *Palmella hyalina* δ *rivularis* Kützing, Sp. Algar., p. 215. 1849. *Aphanocapsa rivularis* Rabenhorst, Fl. Eur. Algar. 2: 49. 1865. *Palmella hyalina* f. *rivularis* Crouan fr., Fl. Finistère, p. 109. 1867. *P. littoralis* Crouan fr. pro synonym., loc. cit. 1867. *Microcystis Grevillei* f. *rivularis* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec., 1: 129. 1938. —Type from Great Britain: Carmichael (K). FIG. 294.

Palmella botryoides var. *uda* Kützing, Linnaea 8: 376. 1833. *Botrydina uda* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 47. 1843. *Botrydiopsis uda* Trevisan, Nomencl. Algar. 1: 70. 1845. —Type from Thuringia: Hirschberg, herb. Kützing, 6 Jun. (L).

Palmella sordida Kützing, Linnaea 8: 377. 1833. *Coccochloris sordida* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 46, 67. 1843. —Type from Germany: an Kellerwänden in Schleusingen, F. T. Kützing (L). FIG. 283.

Bromicolla aleutica Eichwald, Förh. Skandinav. Naturf., 3rd Möte, Stockholm, 13—19 Juli 1842, p. 615. 1843. —Type from the Aleutian islands: Ins. Unimah (LD). FIG. 290.

Gloeocapsa botryoides Kützing, Phyc. Gener., p. 173. 1843. *Bichatia botryoides* Trevisan, Nomencl. Algar. 1: 60. 1845. *Gloeocystis botryoides* Nägeli, Gatt. Einzell. Alg., p. 65. 1849. —Type from Germany: ad palos, Nordhausen, herb. Kützing (L). FIG. 255.

Gloeocapsa montana Kützing, Phyc. Gener., p. 173. 1843. *Bichatia montana* Trevisan, Nomencl. Algar. 1: 61. 1845. *B. Kuetzingiana* Trevisan, Sagg. Monogr. Alg. Coccot., p. 62. 1848. *Gloeocapsa caldarii* Suringar pro synonym., Obs. Phycol. p. 54. 1855. *Gloeocapsa caldarium* Rabenhorst, Fl. Eur. Algar. 2: 37. 1865. *G. montana* γ *caldarii* Suringar pro synonym. ex Rabenhorst, loc. cit. 1865. *G. montana* f. *caldarii* Suringar ex Kirchner, Krypt.-Fl. Schlesien 2(1): 257. 1878. *Bichatia caldarium* Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Gloeocapsa montana* var. *caldarii* Suringar ex Tilden, Amer. Alg. 2: 197. 1896. —Type from Germany: Nordhausen, herb. Kützing (L). FIG. 266.

Gloeocapsa palea Kützing, Phyc. Gener., p. 173. 1843. *Bichatia palea* Trevisan, Nomencl. Algar. 1: 61. 1845. *Coccochloris vernicosa* Brébisson pro synonym. in Kützing, Sp. Algar., p. 217. 1849. *Gloeotheca palea* Nägeli, Gatt. Einzell. Alg., p. 57. 1849. —Type from Bohemia: Carlsbad, herb. Kützing (L). FIG. 263.

Gloeocapsa salina Roemer, Alg. Deutschl., p. 63. 1845. *Bichatia salina* Trevisan, Sagg. Monogr. Alg. Coccot., p. 64. 1848. —Type from Germany: Salzboden bei Hildesheim (NY). FIG. 269.

- Protococcus dissectus* Kützing, Phyc. Germ., p. 144. 1845. *Pleurococcus dissectus* Trevisan, Sagg. Monogr. Alg. Coccot., p. 34. 1848. *Protococcus dissectus* var. *articulatus* Suringar, Obs. Phycol., p. 56. 1855. *Protococcus viridis* var. *dissectus* Wolle, Freshw. Alg. U. S., p. 181. 1887. —Type from Germany: Nordhausen, F. T. Kützing, 12 Oct. 1839 (L).
- Palmella margaritacea* Kützing, Phyc. Germ., p. 149. 1845. *Cagniardia margaritacea* Trevisan, Sagg. Monogr. Alg. Coccot., p. 49. 1848. *Aphanothece margaritacea* Forti, Syll. Myxophyc., p. 79. 1907. —Type from Dalmatia: Lesina, Botteri (L). FIG. 286.
- Gloeocapsa palea* β minor Kützing, Phyc. Germ., p. 151. 1845. *G. confluens* β *palacea* Kützing, Sp. Algar., p. 217. 1849. —Type from Germany: in Tannengesatz, Oldenburg, Koch, Nov. 1844 (L). FIG. 262.
- Haematococcus Allmanii* Hassall, Hist. Brit. Freshw. Alg. 1: 322. 1845. *Hassallia Allmanii* Trevisan, Sagg. Monogr. Alg. Coccot., p. 6. 1848. *Urococcus Allmanii* Hassall ex Kützing, Sp. Algar., p. 206. 1849. —Type from England: "C. Allmanii", herb. Hassall (BM).
- Haematococcus cryptophilus* Hassall, Hist. Brit. Freshw. Alg. 1: 324. 1845. *Palmella cryptophila* Carmichael pro synon. in Hassall, loc cit. 1845. *Hassallia cryptophila* Trevisan, Sagg. Monogr. Alg. Coccot., p. 67. 1848. *Urococcus cryptophilus* Hassall ex Kützing, Sp. Algar., p. 206. 1849. —Type from Great Britain: Appin, Carmichael (BM).
- Haematococcus Hookerianus* Berkeley & Hassall in Hassall, Hist. Brit. Freshw. Alg. 1: 325. 1845. *Hassallia Hookeriana* Trevisan, Sagg. Monogr. Alg. Coccot., p. 67. 1848. *Urococcus Hookerianus* Berkeley & Hassall ex Kützing, Sp. Algar., p. 206. 1849. *Gloeocapsa Hookeri* Berkeley & Hassall in Berkeley, Introduct. Crypt. Bot., p. 117. 1857. —Paratype, here designated as the Type, from England: Bristol, Jan. 1847, in herb. Berkeley (K). FIG. 264.
- Palmella borealis* Kützing, Tab. Phyc. 1: 6. 1846. *Cagniardia borealis* Trevisan, Sagg. Monogr. Alg. Coccot., p. 49. 1848. —Type (with that of *Gloeocapsa rupicola* Kütz.) from Norway: Sprenkel (L). FIG. 279.
- Palmella Botteriana* Kützing, Tab. Phyc. 1: 10. 1846. *Cagniardia Botteriana* Trevisan, Sagg. Monogr. Alg. Coccot., p. 49. 1848. —Type from Dalmatia: Lesina, Botteri (L). FIG. 282.
- Palmella adriatica* Kützing, Tab. Phyc. 1: 11. 1846. *Cagniardia adriatica* Trevisan, Sagg. Monogr. Alg. Coccot., p. 49. 1848. *Aphanothece Le-Jolisii* Thuret pro synon. ex Chalon, Liste des Alg. Mar., p. 32. 1905. *Aphanocapsa Le-Jolisii* Frémy, Bull. Soc. Linn. Normandie, ser. 7, 7: 18. 1925. —Type from Dalmatia: ex herb. Meneghini (L). FIG. 287.
- Palmella laxa* Kützing, Tab. Phyc. 1: 11. 1846. *Bichatia laxa* Trevisan, Sagg. Monogr. Alg. Coccot., p. 66. 1848. *Aphanothece laxa* Rabenhorst, Krypt.-Fl. Sachsen 1: 76. 1863. —Type from Netherlands: Goes, van den Bosch 198, Jan. 1846 (L). FIG. 291.
- Gloeocapsa confluens* Kütz., Tab. Phyc. 1: 14. 1846. *Bichatia confluens* Trevisan, Sagg. Monogr. Alg. Coccot., p. 62. 1848. *Gloeotheca confluens* Nägeli, Gatt. Einzell. Alg., p. 58. 1849. *Gloeocystis confluens* Richter in Hauck & Richter, Phyk. Univ. 1: 81. 1886. *Dactylothece confluens* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 322. 1891. —Type from Germany: Nordhausen, F. T. Kützing (L) FIG. 259.
- Gloeocapsa quaternata* Kützing, Tab. Phyc. 1: 15. 1846. *Coccochloris quaternata* Brébisson pro synon. in Kützing, loc. cit. 1846. *Bichatia quaternata* Trevisan, Sagg. Monogr. Alg. Coccot., p. 62. 1848. *Gloeocystis quaternata* Richter in Hauck & Richter, Phyk. Univ. 1: 81. 1886. *Gloeocapsa quaternaria* Kützing ex Geitler, Rabenh. Krypt.-Fl. 14: 197. 1932. —Type from France: Falaise, A. de Brébisson (L). FIG. 278.
- Gloeocapsa cryptococca* Kützing, Tab. Phyc. 1: 15. 1846. *Bichatia cryptococca* Trevisan, Sagg. Monogr. Alg. Coccot., p. 62. 1848. —Type from Harz mountains, Germany: "G. cryptococca Kg." (L). FIG. 258.
- Gloeocapsa polydermatica* Kützing, Tab. Phyc. 1: 15. 1846. *Bichatia polydermatica* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from France: "Microcystis rupestris", Falaise, Brébisson (L). FIG. 276.
- Gloeocapsa muralis* Kützing, Tab. Phyc. 1: 17. 1846. *Bichatia muralis* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Germany: an feuchten Mauern, Nordhausen, Kützing (L). FIG. 261.
- Gloeocapsa squamulosa* Brébisson in Kützing, Tab. Phyc. 1: 17. 1846. *Bichatia squamulosa* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from France: Falaise, A. de Brébisson (L). FIG. 275.
- Gloeocapsa microphthalma* Kützing, Tab. Phyc. 1: 25. 1846. *Bichatia microphthalma* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Germany: ad cataracta pr. Nordhausen, Kützing (L).
- Palmogloea vesiculosa* Kützing, Tab. Phyc. 1: 25. 1846. —Type from Germany: in turfosis humidis pr. Jever, Koch, Apr. 1846 (L).
- Palmella (Gloeocapsa) chrysophthalma* Montagne, Ann. Sci. Nat. III. Bot. 12: 286. 1849. *Gloeocystis chrysophthalma* Montagne ex Farlow in Farlow, Anderson & Eaton, Alg. Exs. Am. Bor. no. 230. 1889. *Bichatia chrysophthalma* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from France: Etretat, F. Baudry (PC). FIG. 273.
- Cryptococcus vermicosus* Kützing, Sp. Algar., p. 146. 1849. —Type from France: Falaise, Le Bailly (L).
- Palmella parietina* Nägeli in Kützing, Sp. Algar., p. 212. 1849. *Aphanocapsa parietina* Nägeli,

Gatt. Einzell. Alg., p. 52. 1849. *Microcystis parietina* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 135. 1938. —Type from Switzerland: Rheinfall, Nägeli (L). FIG. 280.

Gloeocapsa flavo-aurantia Kützinger, Sp. Algar., p. 218. 1849. *G. montana* f. *flavo-aurantia* Kützinger ex Rabenhorst, Fl. Eur. Algar. 2: 37. 1865. *G. montana* var. *flavo-aurantia* Kützinger ex Hansgirg, Prodr. Algenfl. Böhmen 2: 152. 1892. —Type from France: au bas d'un mur humide, Chermont, M. Tillette, Apr. 1846 (in Desmazières, Pl. Crypt. Fr. 1956, NY).

Endospira bryophila Brébisson in Desmazières, Pl. Crypt. France, ser. 2, 1954. 1850. *Coccochloris muscorum* Brébisson pro synon., loc. cit. 1850. —Type from France: sur le mousse humide (in Desmaz., Pl. Crypt. Fr. 1954, FI).

Gloeocapsa palmelloides Rabenhorst, Alg. Sachs. 27—28: 262. 1853. *Gloeotheca palmelloides* Rabenhorst, Krypt.-Fl. Sachsen 1: 75. 1863. —Type from Thuringia: am Falkenstein im Dintharzer Grund, A. Roese, 1852 (in Rabenh. Alg. 262, FC). FIG. 277.

Gloeocapsa insignis Thuret, Mém. Soc. Nat. Sci. Nat. Cherbourg 2: 388. 1854. —Type from France: Cherbourg, sur l'écorce des arbres de la route de Paris, G. Thuret, 19 Jan. 1853 (PC).

Gloeocapsa romana Montagne, Syll. Gen. Spec. Crypt., p. 470. 1856. *Bichatia romana* Kuntze, Rev. Gen. Pl. 2: 886. 1891. —Type from Italy: Roma, E. Fiorini-Manzatti (PC).

Gloeotheca distans Stizenberger in Rabenhorst, Alg. Sachs. 97—98: 971. 1860. —Isotypes from Germany: Constanz, E. Stizenberger, Apr. 1860 (in Rabenh. Alg. 971, FC, TA). FIG. 272.

Gloeocystis riparia A. Braun in Rabenhorst, Alg. Eur. 172—173: 1729. 1864. —Isotypes from Germany: Sallentin, Insel Usedom, A. Braun, Aug. 1864 (in Rabenh. Alg. 1729, FC, NY). FIG. 271.

Palmella littorea Crouan fr. in Schramm & Mazé, Essai Class. Alg. Guadeloupe, p. 29. 1865; ibid., p. 67. 1866; in Mazé & Schramm, Essai Class. Alg. Guadeloupe, ed. 2, p. 12. 1870—77. —Type from La Guadeloupe: Lac Simpson, Saint-Martin (PC). FIG. 296.

Gloeocapsa Goeppertiana Hilse in Rabenhorst, Algen Eur. 221—222: 2220. 1870. *Gloeotheca Goeppertiana* Forst, Syll. Myxophyc., p. 62. 1907. —Isotypes from Silesia (Poland): ad Vratislaviam, Hilse, May 1870 (FH, L, NY, UC).

Chroococcus granulatus Zeller, Journ. Asiatic Soc. Bengal 42(2): 176. 1873; Hedwigia 12: 169. 1873. —Type from Burma: auf blosser Erde, Thabyaegon, S. Kurz (in Rabenh. Alg. 2332, S).

Protococcus affinis Dickie, Journ. Linn. Soc. Bot. 14: 358. 1875. —Type from St. Paul's Rocks, Atlantic Ocean: on stalactitic guano in sheltered crevices, H. N. Moseley, 18 Aug. 1873 (BM).

Gloeotheca involuta Reinsch, Journ. Linn. Soc. Bot. 15: 206. 1876. —Type from Kerguelen island: *Venus Expedition*, 1874—75 (K).

Dactylothece Braunii Lagerheim, Öfvers. K. Sv. Vet.-Akad. Förh. 40(2): 64. 1883. —Isotypes from Uppsala, Sweden, in Wittrock & Nordst., Alg. Exs. 531 (FC, UC). FIG. 256.

Rhodococcus caldarium Hansgirg in Wittrock & Nordstedt, Alg. Exs. 14: 697. 1884; in Wittrock & Nordstedt, Bot. Notiser 1884: 128. 1884; Oesterr. Bot. Zeitschr. 34: 315. 1884. *Chroococcus caldarium* Hansgirg, Bot. Centralbl. 22: 33. 1885. —Type from Bohemia: in parietibus caldarium horti botanici Pragae, A. Hansgirg, 22 Dec. 1883 (in Wittrock & Nordst., Alg. Exs. 697, W); isotypes, FC, L, S, and in Kerner, Fl. Exs. Austro-Hung. 2399 & Nachtrag, S). FIG. 257.

Gloeocapsa salina Hansgirg, Oesterr. Bot. Zeitschr. 35: 115. 1885. —Type from Bohemia: Ouzic ad Kralup, A. Hansgirg, Oct. 1883 (W). FIG. 297.

Inoderma majus Hansgirg, Physiol. & Algol. Stud., p. 93. 1887; Oesterr. Bot. Zeitschr. 37: 122. 1887. —Type from Bohemia: Harrachsdorf, A. Hansgirg, Jul. 1886 (W). FIG. 288.

Gloeocystis rupestris var. *subaurantiaca* Hansgirg, Prodr. Algenfl. Böhmen 1(2): 136. 1888. —Type from Bohemia: Selc nächst Roztok, A. Hansgirg, Nov. 1886 (W). FIG. 295.

Gloeocystis vesiculosa var. *caldarium* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 321. 1891. —Type from Bohemia: Tetschen, A. Hansgirg, Aug. 1890 (W). FIG. 293.

Spirotaenia closteridia var. *elongata* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 329. 1891. —Type from Bohemia: Edmundsklamm nächst Herrnskretschen, A. Hansgirg, Sept. 1890 (W).

Gloeocapsa nigra var. *minor* Hansgirg, Prodr. Algenfl. Böhmen 2: 152. 1892. —Type from Bohemia: Eichwald, A. Hansgirg, Jul. 1883 (W). FIG. 284.

Pleurococcus miniatus var. *virescens* Hansgirg, Prodr. Algenfl. Böhmen 2: 235. 1892. —Type from Bohemia: zwischen Debr und Josephthal, A. Hansgirg, 1891 (W). FIG. 281.

Botryococcus Braunii var. *mucosus* Lagerheim in Hansgirg, Prodr. Algenfl. Böhmen 2: 242. 1892. —Type from Bohemia: Edmundsklamm nächst Herrnskretschen, A. Hansgirg, Sept. 1890 (W). FIG. 285.

Dactylococcus sabulosus Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(1): 12. 1890. *Keratococcus sabulosus* Pascher, Süßwasserfl. 5(Chlorophyc. 2): 217. 1915. —Type from Bohemia: zwischen Dittersbach und Hinter-Dittersbach, A. Hansgirg, Juli 1889 (W).

Urococcus pallidus Lagerheim in Wittrock, Nordstedt, & Lagerheim, Alg. Exs. 23: 1086. 1893. —Isotype from Ecuador: in rupibus humidis ad fluminem Pastasa prope Baños, prov. Tungurahua, G. Lagerheim, 2 Jan. 1892 (in Wittrock, Nordst., & Lagerh., Alg. Exs. 1086, NY).

Dactylococcopsis montana W. & G. S. West., Journ. of Bot. 36: 337. 1898. —Type from Yorkshire, England: Cowgill Wold Moss, Widdale Fell, herb. West, Apr. 1898 (BIRM).

Chroococcus Simmeri Schmidle in Simmer, Allgem. Bot. Zeitschr. 1898: 158. 1899. *Gloeocapsa magna* var. *Simmeri* Nováček ex Geidler, Rabenh. Krypt.-Fl. 14: 1164. 1932. —Type from Carinthia, Austria: an einer alten, faulen Lärche im Gurskenthale, Kreuzeckgebiet, H. Simmer, 27 Aug. 1898 (Z).

Chrootheca cryptarum Farlow in Collins, Holden, & Setchell, Phyc. Bor.-Amer. 16: 752. 1900. *Entophyalis cryptarum* Drouet, Field Mus. Bot. Ser. 20: 128. 1942. —Type from Bermuda: Aggar's cave, W. G. Farlow, 1881 (FH). FIG. 265.

Microcystis chroococcoides W. & G. S. West, Brit. Antarct. Exped. 1907—09, 1: 296. 1911. *Chroococcus microcystoides* W. & G. S. West, loc. cit. 1911. —Type from Antarctica: Green lake, Ross island (BIRM).

Dactylococcopsis antarctica Fritsch, Nat. Antarct. Exped. (1901—04), Nat. Hist. 6 (Freshw. Alg.): 22. 1912. —Type from Antarctica: on *Nostoc commune* in damp spots, Granite Harbour, New Bay, no. 47c, 20 Jan. 1902 (BM).

Gloeocapsa sibogae Weber-van Bosse, Siboga Exped., Liste des Alg., 1: 6. 1913. —Type from Indonesia: Sabuda, A. A. Weber-van Bosse, 1899—1900 (L). FIG. 268.

Gloeotheca Vibrio Carter in Compton, Journ. Linn. Soc. Bot. 46: 50. 1922. —Type from New Caledonia: river Dumbéa, R. H. Compton 811 (BM).

Chroococcus constrictus Gardner, Mem. New York Bot. Gard. 7: 8. 1927. —Type from Puerto Rico: Rio Piedras, N. Wille 1965, 23 Mar. 1915 (NY). FIG. 267.

Gloeocapsa cartilaginea Gardner, Mem. New York Bot. Gard. 7: 9. 1927. —Type from Puerto Rico: Maricao, N. Wille 1025, 12 Feb. 1915 (NY). FIG. 260.

Gloeocapsa sphaerica Gardner, Mem. New York Bot. Gard. 7: 12. 1927. —Type from Puerto Rico: Arecibo—Uruado, N. Wille 1482a, 4 Mar. 1915 (NY). FIG. 270.

Gloeotheca opalothecata Gardner, Mem. New York Bot. Gard. 7: 14. 1927. —Type from Puerto Rico: Hato Arriba near Arecibo, N. Wille 1434, Mar. 1915 (NY). FIG. 292.

Chroococcus schizodermaticus var. *incoloratus* Geidler, Arch. f. Hydrobiol., Suppl. 12, 4: 623. 1933. —Type from Java: Travertin-Hügel von Kuripan, Rutner (slide BK2d in the collection of L. Geidler).

Cyanostylon cylindrocellularis Geidler, Arch. f. Hydrobiol., Suppl. 12, 4: 623. 1933. —Type from Java: Tjurug Dengeng, Tjibeureum, Gebiet von Tjibodas, Rutner, 9 Jul. 1929 (slide Tj2IIa α in the collection of L. Geidler).

No original or authentic specimens have been available to us for the following names; the original descriptions are here designated as the Types until the specimens can be found:

Protococcus atrovirens Corda in Sturm, Deutschl. Fl., Abt. 2, 6: 43. 1833. *Microcystis atrovirens* Kützinger, Linnæa 8: 374. 1833. *Protosphaeria atrovirens* Trevisan, Sagg. Monogr. Alg. Coccot., p. 30. 1848. *Gloeocapsa atrovirens* Richter in Hauck & Richter, Phyk. Univ. 1: 42. 1885. *Chroococcus atrovirens* Hansgirg, Bot. Centralbl. 22: 25. 1885.

Coccolithus Schrenkii Corda in Sturm, Deutschl. Fl., Abt. 2, 6: 49. 1833.

Gloeocapsa microcosmus Roemer, Alg. Deutschl., p. 62. 1845. *Bichatia microcosmus* Trevisan, Sagg. Monogr. Alg. Coccot., p. 63. 1848.

Haematococcus microsporus Hassall, Hist. Brit. Freshw. Alg. 1: 334. 1845. *Bichatia Hassallii* Trevisan, Sagg. Monogr. Alg. Coccot., p. 65. 1848.

Coccolithus variabilis Hassall, Hist. Brit. Freshw. Alg. 1: 441. 1845. *Bichatia variabilis* Trevisan, Sagg. Monogr. Alg. Coccot., p. 66. 1848.

Coccolithus obscura Hassall, Hist. Brit. Freshw. Alg. 1: 442. 1845. *Bichatia obscura* Trevisan, Sagg. Monogr. Alg. Coccot., p. 65. 1848.

Gloeocystis vesiculosa Nägeli, Gatt. Einzell. Alg., p. 65. 1849. *G. ampla* b. *vesiculosa* Kirchner, Krypt.-Fl. Schlesien 2(1): 112. 1878. *Gloeocapsa macrococca* Hansgirg, Prodr. Algenfl. Böhmen 1: 135. 1886.

Spirotaenia muscicola De Bary, Unters. Fam. Conjugat., p. 75. 1858.

Gloeocapsa ocellata Rabenhorst, Krypt.-Fl. Sachsen 1: 72. 1863. *Bichatia ocellata* Kuntze, Rev. Gen. Pl. 2: 886. 1891.

Cyanostylon microcystoides Geitler, Arch. f. Protistenk. 60: 442. 1928.

Vanhoeffenia antarctica Wille, Deutsche Südpolar-Exped. 1901—03, 8: 423. 1928.

Gloeocystis cylindrica Jao, Sinensia 11: 251. 1940.

Gloeocystis Bacillus Teiling, Bot. Notiser 1942: 64. 1942.

Chroococcus splendidus Jao, Sinensia 15: 75. 1944.

Hormotheca rupestris Jao, Sinensia 15: 77. 1944.

Stilocapsa sinica Ley, Bot. Bull. Acad. Sinica 1: 77. 1947.

Asterocapsa gloeotheciformis Chu, Ohio Journ. Sci. 52(2): 97. 1952.

Entophyalis robusta Chu, Ohio Journ. Sci. 52(2): 100. 1952.

Cyanostylon sinensis Chu, Ohio Journ. Sci. 52(2): 100. 1952.

Plantae aerugineae, virides, nigrae, vel rubrae, crustaceae, pulvinatae, vel stratosae, gelatinosae, coriaceae, corneae, vel farinariae, cellulis sphaericis, ellipsoideis, vel fusiformibus, diametro 2—15 μ crassis; chloroplastidibus viridibus, saepe cum haematochroma obscuratis; gelatino vaginale hyalino vel deinde coerulescente vel rubrescente vel fusciscente, homogoeo aut circa unamquidque cellulam (saepe concentricae vel excentricae) pluri-lamellato, haud raro in caudicibus ramosis increscente. FIGS. 255—298.

On the ground (often among mosses), on wood and rocks, often in seepage, often in shaded places, and sometimes in intertidal zones on marine shores, throughout the world. The cells are bright green in sunny habitats, and starch may be seen as granules in the cytoplasm when stained with iodine. In shaded habitats, the starch is not evident except in the cells at the surface. Strata are often well developed in the mouths of moist caves where little light penetrates; here the chloroplasts appear blue-green or are obscured by haematochrome in the cytoplasm. Here also the excentric development of the sheath material often results in the formation of branched stalks bearing the cells imbedded in their upper ends. Where more light is available, concentrically or excentrically lamellose sheaths are conspicuous about the individual cells or small groups of cells. The gelatinous material is chiefly pectic and therefore subject to hydrolysis, especially during its formation; completely homogeneous, and even sirupy, gelatinous matrices are often encountered in seepage and continuously wet habitats. Brown and "indicator" red and blue pigments develop in the matrices in dry sunny locations. Fungi grow in the sheaths, and some of them parasitize the cells. With certain fungi the cells continue to grow as lichens. *Palmogloea protuberans* is most easily confused with *Coccolchloris stagnina*, *Entophysalis densa*, and the palmelloid growth-forms of *Stichococcus subtilis* (Kütz.) Klerck. and *Schizogonium murale* Kütz.

Other names excluded from the Chroococcaceae, Chamaesiphonaceae, and Clastidiaceae are the following:

Achnanthes quadrijugum Turpin, Mém. Mus. d'Hist. Nat. Paris 16: 310. 1828. *Gonidium quadrijugum* Meneghini, Linnaea 14: 214. 1840. *Agmenellum quadrijugum* Trevisan, Prosp. della Fl. Eug., p. 58. 1842. *Sphaerastrum pictum* Trevisan, Nomencl. Algar. 1: 28. 1845. —The original description is designated as the temporary Type = CHLOROPHYCEAE.

CHROOCOCCACEAE Subfam. CHROOCYSTEAE Hansgirg, Notarisia 3: 588. 1888. —Type genus: ALLOGONIUM Kützing, Phyc. Gener., p. 245. 1843. —Type species: *A. conservaceum* Kützing, loc. cit. 1843. *A. conservaceum* α *tergestinum* Kützing, Sp. Algar., p. 364. 1849. *A. tergestinum* Kützing, Tab. Phyc. 3: 10. 1853. —Type from Istria: in aqua subsalsa, Zaule, F. T. Kützing (L) = MICROSPORA STAGNORUM (Kütz.) Lagerh.

Allogonium conservaceum β *Kochianum* Kützing, Sp. Algar., p. 364. 1849. *A. Kochianum* Kützing, Tab. Phyc. 3: 10. 1853. —Type from Oldenburg, Germany: in Gräben, Jever, Koch, Apr. 1844 (L) = MICROSPORA STAGNORUM (Kütz.) Lagerh.

Allogonium halophilum Hansgirg, Physiol. & Algol. Stud., p. 110. 1887; Hansgirg, Hedwigia 26: 22. 1887. *Asterocystis halophila* Forti, Syll. Myxophyc., p. 691. 1907. —Type from Bohemia: in den Salzwassersümpfen bei Auzitz nächst Kralup, *A. Hansgirg*, Jul. 1886 (W) = ASTEROCYTIS ORNATA (Ag.) Hamel. FIG. 310.

Allogonium halophilum var. *stagnale* Hansgirg, Prodr. Algenfl. Böhmen 2: 132. 1892. *Asterocystis halophila* var. *stagnalis* Hansgirg ex Forti, Syll. Myxophyc., p. 691. 1907. —The original description is designated here as the temporary Type = ASTEROCYTIS ORNATA (Ag.) Hamel.

Allogonium ramosum var. *crassum* Hansgirg, Oesterr. Bot. Zeitschr. 39: 4. 1889. —Type from Jugoslavia: im Hafen von Lussin-piccolo, *A. Hansgirg*, Aug. 1888 (W) = ASTEROCYTIS ORNATA (Ag.) Hamel. FIG. 302.

Allogonium smaragdinum var. *palustre* Hansgirg, Notarisia 3: 399. 1888. *A. smaragdinum* b. *palustre* Hansgirg, Prodr. Algenfl. Böhmen 2: 132. 1892. *Asterocystis smaragdina* var. *palustris*

Hansgirg ex Forti, Syll. Myxophyc., p. 691. 1907. —Type from Bohemia: Gross Wossek, A. *Hansgirg*, Aug. 1887 (W). = *ASTEROCYTIS ORNATA* (Ag.) Hamel. FIG. 303.

Allogonium Wolleanum var. *callicola* *Hansgirg*, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(1): 18. 1890. *Asterocytis Wolleana* var. *callicola* *Hansgirg ex Forti*, Syll. Myxophyc., p. 689. 1907. —Type from Dalmatia: Clissa nächst Spalato, A. *Hansgirg*, Aug. 1889 (W) = *ASTEROCYTIS ORNATA* (Ag.) Hamel. FIG. 305.

Allogonium Wolleanum var. *simplex* *Hansgirg*, Prodr. Algenfl. Böhmen 2: 131. 1892. —Type from Bohemia: Selc, *Hansgirg*, Nov. 1886 (W) = *ASTEROCYTIS ORNATA* (Ag.) Hamel.

Alternantia Geileri Schiller, Sitzungsber. Oesterr. Akad. Wiss., Math.-Nat. Kl., I, 163: 134. 1954. —The original description is here designated as the temporary Type = BACTERIA.

Alternantia quadriga Schiller, Sitzungsber. Oesterr. Akad. Wiss., Math.-Nat. Kl., I, 163: 136. 1954. —The original description is here designated as the temporary Type = BACTERIA.

Alternantia ramifera Schiller, Sitzungsber. Oesterr. Akad. Wiss., Math.-Nat. Kl., I, 163: 136. 1954. —The original description is here designated as the temporary Type = BACTERIA.

ALTERNANTIACEAE Schiller, Sitzungsber. Oesterr. Akad. Wiss., Math.-Nat. Kl., I, 163: 134. 1954. —Type genus: *ALTERNANTIA* Schiller, loc. cit. 1954. —Type species: *A. sorra* Schiller, loc. cit. 1954. —The original description is here designated as the temporary Type = BACTERIA.

Alternantia tabularis Schiller, Sitzungsber. Oesterr. Akad. Wiss., Math.-Nat. Kl., I, 163: 136. 1954. —The original description is here designated as the temporary Type = BACTERIA.

Anacyctis paludosa Rabenhorst, Fl. Eur. Algar. 2: 52. 1865. *Microcystis paludosa* Forti, Syll. Myxophyc., p. 92. 1907. —The original description is here designated as the temporary Type = ZOOCHLORELLA PARASITICA Brandt in OPHRYDIUM sp. or STENTOR sp.

Aphanocapsa albida Zeller, Journ. Asiatic Soc. Bengal 42(2): 176. 1873; Zeller, Hedwigia 12: 169. 1873. —Type from Burma: bei Akgab, prov. Pegu, G. Zeller (in Rabenh. Alg. Eur. 2490, NY [FIG. 346]; isotypes, FC, L, UC) = BACTERIA.

Aphanocapsa crassa Ghose, Journ. Burma Res. Soc. 17(3): 243, 239. 1927. —The original description is here designated as the temporary Type = SCHIZOCHLAMYS AURANTIA (Ag.) Dr. & Daily.

APHANOCAPSA Subgenus *AUTAPHANOCAPSA* *Hansgirg*, Notarisia 3: 589. 1888. —Type species: *Aphanocapsa membranacea* Rabenhorst, Fl. Eur. Algar. 2: 49. 1865. *Aphanothece membranacea* Bornet, Bull. Soc. Bot. France 38: 249. 1891. *Gloeothece membranacea* Bornet, Mém. Soc. Nat. Sci. Nat. Cherbourg 28: 1751. 1892. —Topotype here designated as the Type, from France: fond d'un ruisseau à Mentone, G. Thuret (in Roumeguère, Alg. d'Eau Douce de France 827, L) = BACTERIA.

Aphanocapsa paludosa Rabenhorst, Krypt.-Fl. Sachsen 1: 73. 1863. —The original description is here designated as the temporary Type = palmelloid CHLOROPHYCEAE.

Aphanocapsa rufescens *Hansgirg*, Prodr. Algenfl. Böhmen 2: 157. 1892. —Type from Bohemia: Gross-Wenedig, A. *Hansgirg* (W) = spores of NOSTOC MUSCORUM Ag. FIG. 347.

Aphanothece clathrata W. & G. S. West, Trans. Roy. Irish Acad. 33(A): 111. 1906. —Type from Ireland: Lough Neagh, G. S. West, May 1900 (BIRM) = BACTERIA. FIG. 367.

PELODICTYON Lauterborn, Allgem. Bot. Zeitschr. 19: 98. 1913; Lauterborn, Verh. Nat.-Med. Ver. Heidelberg, N. F., 13: 431. 1916. —Type species: *Aphanothece clathratiformis* Szafer, Bull. Int. Acad. Sci. Cracovie, Cl. Sci. Math. & Nat., ser. B, 1910: 162. 1911. *Pelodictyon clathratiforme* Szafer ex Lauterborn, Allgem. Bot. Zeitschr. 19: 98. 1913; Lauterborn, Verh. Nat.-Med. Ver. Heidelberg, N. F., 13: 431. 1916. *P. Lauterbornii* Geitler in Pascher, Süßwasserfl. 12: 458. 1925. —Type from Galicia, Polish Ukraine: Lubiń wielki pod Lwowem, W. Szafer, 9 Apr. 1910 (in Raciborski, Phyc. Polon. 53, FH) = BACTERIA.

Aphanothece clathratiformis var. *major* Liebetanz, Bull. Int. Acad. Polon. Sci., Cl. Sci. Math. & Nat., ser. B, 1925: 109. 1925. —The original description is here designated as the temporary Type = BACTERIA.

Aphanothece Goetzei Schmidle, Engler Bot. Jahrb. 30: 242. 1901. —The original description is here designated as the temporary Type = the 1—2-celled hormogonia of PHORMIDIUM sp.

Aphanothece gracilis Schiller, Sitzungsber. Oesterr. Akad. Wiss., Math.-Nat. Kl., I, 163: 125. 1954. —The original description is here designated as the temporary Type = BACTERIA.

Aphanothece heterospora Rabenhorst, Alg. Eur. 168—171: 1673. 1864; Rabenhorst, Hedwigia 1864: 144. 1864. —Type from Schleswig, Germany: in lacu prope Lützhöft fl. Flensburgensis, R. Haecker (in Rabenh. Alg. 1673, L; isotypes, FC [FIG. 371], NY) = SCHIZOCHLAMYS AURANTIA (Ag.) Dr. & Daily.

SCHMIDLEA Lauterborn, Allgem. Bot. Zeitschr. 19: 98. 1913. —Type species: *Aphanothece luteola* Schmidle, Beih. z. Bot. Centralbl. 10: 179. 1901. *Schmidlea luteola* Lauterborn, Allgem. Bot. Zeitschr. 19: 98. 1913. —Type from Germany: Ludwigshafen, Lauterborn (ZT) = BACTERIA. FIG. 369.

Aphanothece nidulans var. *endophytica* W. & G. S. West, Journ. Linn. Soc. Bot. 40: 432. 1912. *A. saxicola* f. *endophytica* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 151. 1938. —Type from Scotland: Loch Katrine, W. & G. S. West, 16 Mar. 1909 (BIRM) = the organism called PHORMIDIUM MUCICOLA Naum. & Hub.

Aphanotece nidulans var. *thermalis* Hansgirg, Prodr. Algenfl. Böhmen 2: 137. 1892. *A. saxicola* f. *thermalis* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 151. 1938. —Type from Bohemia: an warmen Quellen in Karlsbad, *A. Hansgirg*, Aug. 1883 (W) = BACTERIA.

PEDIOCHLORIS Geitler in Pascher, Süßwasserfl. 12: 457. 1925. —Type species: *Aphanotece parallela* Szafer, Bull. Int. Acad. Sci. Cracovie, Cl. Sci. Math. & Nat., ser. B, 1910: 163. 1911. *Pediochloris parallela* Geitler in Pascher, Süßwasserfl. 12: 457. 1925. —Type from Polish Ukraine: Lubień wielki pod Lwowem, *W. Szafer*, 9 Apr. 1910 (in Raciborski, Phyc. Polon. 53, FH) = BACTERIA.

Aphanotece piscinalis Rabenhorst, Fl. Eur. Algar. 2: 66. 1865. *Coccochloris piscinalis* Richter in Hauck & Richter, Phyk. Univ. 5: 240. 1888. *Aphanotece stagnina* f. *piscinalis* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 145. 1938. —Type from the Netherlands: in piscina ad Rosendaal, *van den Bosch* (L) = NOSTOC CARNEUM (Lyngb.) Ag. FIG. 368.

CLATHROCHLORIS Geitler in Pascher, Süßwasserfl. 12: 457. 1925. —Type species: *Aphanotece sulphurica* Szafer, Bull. Int. Acad. Sci. Cracovie, Cl. Sci. Math. & Nat., ser. B, 1910: 162. 1911. *Clathrochloris sulphurica* Geitler in Pascher, Süßwasserfl. 12: 457. 1925. —Type from Polish Ukraine: Lubień wielki pod Lwowem, *W. Szafer*, 9 Apr. 1910 (in Raciborski, Phyc. Polon. 53, FH) = BACTERIA.

Aphanotece viennensis Schiller, Sitzungsber. Oesterr. Akad. Wiss., Math.-Nat. Kl., I, 163: 124. 1954. —The original description is here designated as the temporary Type = BACTERIA.

Arthrodesmus glaucescens Wittrock, Bih. K. Sv. Vet.-Akad. Handl. 1(1): 55. 1872. *Tetrapedia glaucescens* Boldt ex de Toni, Nuova Notarisia 3: 105. 1892. —The original description is here designated as the temporary Type = TETRAEDRON sp.

Arthrodesmus glaucescens var. *papilliferus* Gutwinski, Spraw. Kom. Fizyogr. Akad. Umiej. Krakowie 25(2): (16). 1890. *Tetrapedia glaucescens* var. *papillifera* Gutwinski, ibid. 30(2): 162. 1895. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Asterocytis africana G. S. West, Journ. Linn. Soc. Bot. 38: 196. 1907. —Type from Tanganyika: Kituta bay, *W. A. Cunningham* 79, 26 Aug. 1904 (in the slide collection, BM) = *A. ORNATA* (Ag.) Hamel.

Asterocytis antarctica W. & G. S. West, Brit. Antarctic Exped. 1907—09, 1: 296. 1911. —The original description is here designated as the temporary Type. The original sketches and notes by the Wests in the British Museum (Natural History) are reproduced here: FIG. 311 = NOSTOC sp.

Bacularia thermalis Frémy, Explor. Parc Nat. Albert, Mission H. Damas, 19: 39. 1949. —The original description is here designated as the temporary Type = the 1—2-celled hormogonia of PHORMIDIUM TENUE (Menegh.) Gom.

Family PALMELLEAE Kützinger, Phyc. Gener., p. 166. 1843. PALMELLACEAE Nägeli, Die Neuern Algensyst., p. 125. 1847. —Type genus: PALMELLA Lyngbye, Tent. Hydrophyt. Dan., p. 203. 1819. Synonym: CLUZELLA Bory, Dict. Class. Hist. Nat. 3: 14; 4: 234. 1823. —Type species: *Batrachospermum Myosurus* Ducluzeau, Essai s. l'Hist. Nat. Conf. Env. Montpellier, p. 76. 1805. *Palmella Myosurus* Lyngbye, Tent. Hydrophyt. Dan., p. 203. 1819. *Cluzella Myosurus* Bory, Dict. Class. Hist. Nat. 4: 234. 1823. *Coccochloris Myosurus* Sprengel, Linn. Syst. Vegetab., ed. 16, 4(1): 373. 1827. *Hydrurus Ducluzeli* Ag., Consp. Crit. Diatomac. 2: 27. 1830. *Hydrurus Myosurus* Trevisan, Nomencl. Algar. 1: 57. 1845. —It was not considered necessary here to present the complete synonymy of this species. Nägeli in Gatt. Einzell. Alg., p. 66 (1849), selected *Palmella mucosa* Kütz. as the Type for *Palmella* Lyngb.; his selection cannot be considered appropriate under the present International Rules of Nomenclature, since Lyngbye did not treat this species published twenty-four years after his own work appeared. The Type of *Batrachospermum Myosurus* Ducluz. is from France: dans les Cévennes, *Ducluzeau* (PC) = PALMELLA MYOSURUS (Ducluz.) Lyngb.

BICHATIA Turpin, Mém. Mus. d'Hist. Nat. Paris 16: 163. 1828; Turpin, ibid. 15: 376. 1827. *GLOEOCAPSA* Subgenus BICHATIA Forti, Syll. Myxophyc., p. 50. 1907. —Type species: *Bichatia vesiculifera* Turpin, Dict. Sci. Nat., Végét. Acot., 65: pl. 10. 1816—29; Mém. Mus. d'Hist. Nat. Paris 15: 376. 1827; ibid. 16: 163. 1828. —The original description of Turpin is here designated as the temporary Type = the coccoid growth-form of STICHOCOCCUS SUBTILIS (Kütz.) Klerck.

BOANEMA Ercegovic, Acta Bot. Inst. Bot. Univ. Zagreb. 2: 83. 1927. —Type species: *B. scoparium* Ercegovic, ibid., p. 84. 1927. —The original description is here designated as the temporary Type = primordia of RHODOPHYCEAE. Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, lb: 98 (1942) expresses a similar opinion.

PHYTOCONIS Bory, Mém. s. l. Genres Conferva & Byssus, p. 54. 1795. COCCODEA Palisot de Beauvois in Desvaux, Journ. de Bot. 1: 124. 1808. OLIVIA S. F. Gray, Nat. Arr. Brit. Pl., p. 349. 1821. CHAOS Bory, Dict. Class. d'Hist. Nat. 3: 13, 15. 1823. SPHAERELLA Sommerfelt, Mag. f. Naturvid. 4: 252. 1824. CHLOROCOCCUM Fries, Syst. Orb. Veget. 1(Appendix): 356. 1825. GLOBULINA Turpin, Mém. Mus. d'Hist. Nat. Paris 15: 25, 62. 1827. PRIESTLEYA Meyen, Linnaea 2: 301. 1827. MONASELLA Gaillon, Aperçu d'Hist. Nat., p. 29. 1833. BOTRYDINA Brébisson, Mém. Soc. Acad. Sci., Art. & Belles-Lettres Falaise, p. 3 (of reprint).

1839. *BOTRYDIOPSIS* Trevisan, Nomencl. Algar. 1: 70. 1845. *DESMOCOCCUS* Brand, Arch. f. Protistenk. 52: 344. 1925. *PLEUROCOCCUS* Untergattung *TETRACHOCOCCUS* Nägeli, Die Neuern Algensyst., p. 127. 1847. —Type species: *Byssus botryoides* Linnaeus, Sp. Pl., p. 1169. 1753. *Tremella botryoides* Schreber, Spicil. Fl. Lips., p. 141. 1771. *Byssus viridis* Lamarck, Fl. Franc., ed. 1, 1: (103). 1778. *Lepra botryoides* Weber in Wiggers, Primit. Fl. Holsat., p. 97. 1780. *Lichen botryoides* Hagen, Tent. Hist. Lichen., p. x1. 1782. *Phytoconis botryoides* Bory, Mém. s. 1. Genres Conferva & Byssus, p. 54. 1795. *Lepraria botryoides* Acharius, Lichenogr. Suec. Prodr., p. 10. 1798. *Monilia viridis* Sprengel, Fl. Halens., p. 386. 1806. *Globulina botryoides* Turpin, Dict. Sci. Nat. 65 (Végét. Acot.): pl. 4, 6, 7. 1816—29. *Nostoc botryoides* Agardh, Synops. Algar. Scand., p. 135. 1817. *Palmella botryoides* Lyngbye, Tent. Hydrophyt. Dan., p. 205. 1819. *Olivia botryoides* S. F. Gray, Nat. Arr. Brit. Pl., p. 349. 1821. *Chaos primordialis* Bory, Dict. Class. d'Hist. Nat. 3: 16. 1823. *Sphaerella botryoides* Sommerfelt, Mag. f. Naturvid. 4: 252. 1824. *Priestleya botryoides* Meyen, Linnæa 2: 401. 1827. *Chlorococcum vulgare* Greville, Scott. Crypt. Fl. 5: 262. 1827. *Monasella vva* Gaillon, Aperçu d'Hist. Nat., p. 29. 1833. *Coccophysium botryoides* Link, Handb. d. Erkenn. Gewächs. 3: 342. 1833. *Chlorococcum botryoides* Fries, Fl. Scan., p. 330. 1835. *Anacystis botryoides* Meneghini, Consp. Algol. Euan., p. 324. 1837. *Botrydina vulgaris* Brébisson, Mém. Soc. Acad. Sci. Art. & Belles-Lettres Falaise, p. 3 (of reprint). 1839. *Pleurococcus vulgaris* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 38. 1843. *Pleococcus viridis* Kützing, Phyc. Gener., p. 170. 1843. *Haematococcus vulgaris* Hassall, Hist. Brit. Freshw. Alg. 1: 333. 1845. *Lepraria viridis* Jenner, Fl. Tunbridge Wells, p. 150. 1845. *Botrydiopsis vulgaris* Trevisan, Nomencl. Algar. 1: 70. 1845. *Protococcus communis* and *P. communis* β *Pleurococcus* Kützing, Tab. Phyc. 1: 4. 1846. *Protosphaeria viridis* Trevisan, Sagg. Monogr. Alg. Coccot., p. 29. 1848. *Pleococcus botryoides* Trevisan, ibid., p. 42. 1848. *Cagniardia botryoides* Trevisan, ibid., p. 50. 1848. *Protococcus vulgaris* and *P. vulgaris* β *Pleurococcus* Kützing, Sp. Algar., p. 199. 1849. *P. vulgaris* var. *Pleurococcus* Kützing ex Mougeot & Nestler, Stirp. Crypt. Vogeso-Rhen., no. 1294. 1850. *Desmococcus vulgaris* Brand, Arch. f. Protistenk. 52: 344. 1925. —Silva & Starr have enlarged the generic synonymy here by designating, in Sv. Bot. Tidskr. 47(2): 245 (1953), types for *Sphaerella* Sommerf. and *Chlorococcum* Fr. from among the above synonyms of *Byssus botryoides* L. The Type specimen upon which all these names depend is that labeled "Byssus botryoides" in herb. Linnaeus in the Linnaean Society of London = *PHYTOCONIS BOTRYOIDES* (L.) Bory.

BYSSUS Linnaeus, Sp. Pl., p. 1168. 1753. —Type species: *B. flos-aquae* Linnaeus, loc. cit. 1753. *Phytoconis natans* Bory, Mém. s. 1. Genres Conferva & Byssus, p. 54. 1795. *Micraloa flos-aquae* Trevisan, Nomencl. Algar. 1: 76. 1845. —It is unnecessary to the purposes of this paper to present the complete synonymy of *B. flos-aquae* L. here. The Type specimen is that labeled "Byssus flos-aquae" in herb. Linnaeus in the Linnaean Society of London = *OSCILLATORIA PROLIFICA* (Grev.) Gom.

Byssus lactea Linnaeus, Sp. Pl., p. 1169. 1753. *Lichen lacteus* Schreber, Spicil. Fl. Lips., p. 139. 1771. *Lepra lactea* Weber in Wiggers, Primit. Fl. Holsat., p. 97. 1780. *Phytoconis lactea* Bory, Mém. s. 1. Genres Conferva & Byssus, p. 56. 1795. *Globulina lactea* Turpin, Dict. Sci. Nat. 65 (Végét. Acot.): pl. 6, fig. 1. 1816—29. *Protococcus lacteus* Kützing, Linnæa 8: 369. 1833. —The Type, labeled "Byssus lactea", is in the herbarium of Linnaeus in the Linnaean Society of London = a young *LICHEN*.

Callonema Itzigsohnii Reinsch, Contrib. Algol. & Fungol. 1: 41. 1874. *Hormospora pusilla* Itzigsohn pro synon. in Reinsch, loc. cit. 1874. *Allogonium Itzigsohnii* Hansgirg, Hedwigia 26: 23. 1887; Physiol. & Algol. Stud., p. 110. 1887. *Asterocytis Itzigsohnii* Forti, Syll. Myxophyc., p. 690. 1907. —The original description is here designated as the temporary Type = *ASTEROCYTIS ORNATA* (Ag.) Hamel.

CALLONEMA Reinsch, Contrib. Algol. & Fungol. 1: 40. 1874. —Type species: *C. smaragdinum* Reinsch, ibid. 1: 41. 1874. *Allogonium smaragdinum* Hansgirg, Hedwigia 26: 23. 1887; Physiol. & Algol. Stud., p. 110. 1887. *Asterocytis smaragdina* Forti, Syll. Myxophyc., p. 691. 1907. —The original description is here designated as the temporary Type = *ASTEROCYTIS ORNATA* (Ag.) Hamel.

CATELLA Alvik, Bergens Mus. Årbok 1934 (Naturvid. Rekke 6): 37. 1934. —Type species: *C. rubra* Alvik, ibid. p. 38. 1934. —The original description is here designated as the temporary Type = *NOSTOCACEAE*.

Chaetococcus hyalinus Kützing, Osterprogr. Realsch. Nordhausen, p. 6. 1863; Hedwigia 2: 86. 1863. —Type from Cherbourg, France: *A. Le Jolis* 1783 (L) = *ACROCHAETE* sp.

CHALARODORA Pascher, Jahrb. f. Wiss. Bot. 71(3): 460. 1929. —Type species: *C. azurea* Pascher, loc. cit. 1929. —The original description is here designated as the temporary Type = *CHLOROPHYCEAE*.

Chamaesiphon crenothrichoides Zopf, Morphol. Spaltpl., p. 55. 1882; Bot. Centralbl. 10: 35. 1882. —The original description is here designated as the temporary Type = *CRENOTHRIX* sp.

Chamaesiphon gracilis Rabenhorst, Fl. Eur. Algar. 2: 149. 1865. —Type from Germany: Radeberg bei Dresdam, Rabenhorst (L) = filamentous *BACTERIA*.

Chamaesiphon gracilis f. *major* Magnus & Wille, Sitzungsber. Ges. Naturf. Fr. Berlin 1882: 101.

1882. —The original description is here designated as the temporary Type = **AMPHITHRIX** sp.
Chamaesiphon hyalinus Scherffel, Ber. Deutsch. Bot. Ges. 25: 232. 1907. —The original description is here designated as the temporary Type = filamentous BACTERIA.
- Chamaesiphon marinus* Wille & Rosenvinge, Alg. Novaia-Zemlia og Kara-Havet, p. 4. 1885. —The original description is here designated as the temporary Type = filamentous BACTERIA.
- Chamaesiphon Rostafinskii* var. *minor* Hansgirg, Prodr. Algenfl. Böhmen 2: 123. 1892. —Type from Bohemia: Sct. Prokop, A. Hansgirg, Apr. 1887 (W) = FERROBACTERIACEAE. FIG. 366.
- Chaos sanguinaris* Bory, Dict. Class. d'Hist. Nat. 3: 16. 1823. —Type from France: Lille, D. Lelestinboudois (PC) = PORPHYRIDIVM CRUENTUM (Sm. & Sow.) Näg.
- CHLOROBIVM** Nadsom, Bull. Jard. Imp. Bot. St. Petersburg 6: 190. 1906. —Type species: *C. limicola* Nadsom, loc. cit. 1906. —The original description is here designated as the temporary Type = BACTERIA.
- Chlorococcum Montagnei* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 30. 1843. *Protosphaeria Montagnei* Trevisan, Sagg. Monogr. Alg. Coccot., p. 30. 1848. *Protococcus Montagnei* Kützinger, Sp. Algar., p. 200. 1849. —Type from Cuba: M. R. de la Sagra, 1836 (PC) = ASTEROCTIVS ORNATA (Ag.) Hamel.
- Chlorococcum Orsinii* f. *fimicola* Rabenhorst, Fl. Eur. Algar. 3: 60. 1868. —Type from France: Vache, M. Roberge (in Desmazières, Pl. Crypt. Fr., ed. 3, no. 531, UC) = FLAGELLATA.
- Chlorogloea purpurea* Geitler, Arch. f. Protistenk. 62: 98. 1928. —Paratype from eastern Java: Ranau Pakis, Ruttner (in the slide collection of L. Geitler) = PARASITIZED ALGAE.
- CHROOCOCCIVM** Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 624. 1933. —Type species: *C. gelatinosum* Geitler, loc. cit. 1933. —Type from southern Sumatra: Ranau-See, Ruttner (no. R5b in the slide collection of L. Geitler) = palmelloid FLAGELLATA.
- Chroococcus confervoides* A. Braun, Sitzungsber. Ges. Naturf. Fr. Berlin 1875: 99. 1875. —The original description (although very brief) is here designated as the temporary Type = primordia of TRETEPOHLLA sp.
- Chroococcus lageniferus* Hildebrandt ex A. Braun, Sitzungsber. Ges. Naturf. Fr. Berlin 1875: 99. 1875. —The original description is here designated as the temporary Type = primordia of TRETEPOHLLA sp.
- Chroococcus macrococcus* var. *aquaticus* Hansgirg, Oesterr. Bot. Zeitschr. 36: 333. 1886. —Type from Bohemia: Auzitz nächst Kralup, A. Hansgirg, Jul. 1886 (W) = cysts of DINOFLAGELLATES.
- Chroococcus macrococcus* var. *salinarum* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 230. 1892. —Type from Istria: in Salinen bei Strogiano, A. Hansgirg, Jun. 1889 (W) = PERIDIVM sp. FIG. 345.
- Chroococcus macrococcus* f. *stipitatus* Enwald, Medd. Soc. pro Fauna & Fl. Fenn. 30: 151. 1904. —The original description is here designated as the temporary Type = DINOFLAGELLATES.
- Chroococcus minimus* var. *turfosus* Steinecke, Schrift. Phys.-ökon. Ges. Königsberg 56: 25. 1916. —The original description is here designated as the temporary Type = BACTERIA.
- Chroococcus minor* f. *major* W. & G. S. West, Trans. Roy. Microsc. Soc. 1894: 17. 1894. —Type from England: Cronkley Fell, North Yorks, W. & G. S. West, 1888 (BIRM) = CHLOROPHYCEAE.
- Chroococcus monetarum* Reinsch, Flora 67: 176. 1884. —The original description is here designated as the temporary Type = BACTERIA.
- Chroococcus pyriformis* Bennett, Journ. Roy. Microsc. London, ser. 2, 8: 3. 1888. *Aphanothece pyriformis* Hansgirg, Prodr. Algenfl. Böhmen 2: 138. 1892. —The original description is here designated as the temporary Type = ASTEROCTIVS ORNATA (Ag.) Hamel.
- Chroococcus siderochlamys* Skuja, Symbolae Bot. Upsal. 9(3): 38. 1948. —The original description is here designated as the temporary Type = BACTERIA.
- Chroococcus subtilissimus* Skuja, Hedwigia, Sonderabdr. Bd. 77: 21. 1937. —The original description is here designated as the temporary Type = BACTERIA.
- Chroococcus vacuolatus* Skuja, Acta Horti Bot. Univ. Latv. 11—12: 42. 1939. —The original description is here designated as the temporary Type = ERYTHROCONIS LITTORALIS Oerst.
- Chroococcus Zopfii* Hansgirg, Bot. Centralbl. 22: 24. 1885. —The original description is here designated as the temporary Type = parasitized SCYTONEMA or STIGONEMA sp.
- CHROODACTIVLON** Hansgirg, Ber. Deutsch. Bot. Ges. 3: 14. 1885. **ALLOGONIVM** Section **CHROODACTIVLON** Hansgirg, Physiol. & Algal. Stud., p. 110. 1887. **ALLOGONIVM** Subgenus **CHROODACTIVLON** Hansgirg, Notarisia 3: 588. 1888. —Type species: *Chroodactylon Wolleanum* Hansgirg, Ber. Deutsch. Bot. Ges. 3: 14, 15. 1885. *Asterocytis Wolleana* Lagerheim in Wittrock & Nordstedt, Alg. Exs. 16: 769. 1886. *Allogonium Wolleanum* Hansgirg, Hedwigia 26: 23. 1887; Oesterr. Bot. Zeitschr. 37: 56. 1887; Physiol. & Algal. Stud., p. 96, 110, 164. 1887. —Type from Bohemia: Pürlitz, A. Hansgirg, Sept. 1884 (in Wittrock & Nordstedt, Alg. Exs. 769, W) = ASTEROCTIVS ORNATA (Ag.) Hamel. FIG. 307.
- Chroolepus coeruleum* Nägeli in Kützinger, Sp. Algar., p. 425. 1849. *Allogonium coeruleum* Hansgirg, Hedwigia 26: 23. 1887; Physiol. & Algal. Stud., p. 110. 1887. —Type from Switzerland: with *Gloeocephala scopulorum*, an Felsen, Rheinfall, Nägeli, Jul. 1847 (M) = FUNGI.

CHROOMONAS Hansgirg, *Physiol. & Algol. Stud.*, p. 117. 1887. —Type species: *C. Nordstedtii* Hansgirg, *Bot. Centralbl.* 23: 230. 1885. —Type from Bohemia: Nusle ad Pragam, *A. Hansgirg* (in Witttr. & Nordst., *Alg. Exs.* 800½, FC) = *FLAGELLATA*.

CHROOSTIPES Pascher, *Ber. Deutsch. Bot. Ges.* 32: 351. 1914. —Type species: *C. linearis* Pascher, loc. cit. 1914. —The original description is here designated as the temporary Type = *BACTERIA*.

Chrootheca mobilis Pascher & Petrová, *Arch. f. Protistenk.* 74: 490. 1931. —The original description is here designated as the temporary Type = *ASTEROCYTIS ORNATA* (Ag.) Hamel.

CHROOCOCCACEAE Subfam. *EUCHROOCOCCACEAE* Trib. *THECINEAE* Hansgirg, *Notarisia* 3: 589. 1888. —Type genus: *CHROOTHECE* Hansgirg, *Oesterr. Bot. Zeitschr.* 34: 352. 1884; in Wittrock & Nordstedt, *Alg. Exs.* 14: 696. 1884; in Wittrock & Nordstedt, *Bot. Notiser* 1884: 128. 1884. —Type species: *C. Richteriana* Hansgirg, loc. cit. 1884. —Type from Bohemia: Auzitz prope Kralup, *A. Hansgirg*, 6 Apr. 1884 (FC) = *ASTEROCYTIS ORNATA* (Ag.) Hamel. FIG. 306.

Chrootheca Richteriana var. *aquatica* Hansgirg, *Oesterr. Bot. Zeitschr.* 36: 333. 1886. —Type from Bohemia: Auzitz nächst Kralup, *A. Hansgirg*, Jul. 1886 (W) = *ASTEROCYTIS ORNATA* (Ag.) Hamel. FIG. 309.

Chrootheca Richteriana f. *marina* Hansgirg, *Oesterr. Bot. Zeitschr.* 39: 5. 1889. —The original description is here designated as the temporary Type = *ASTEROCYTIS ORNATA* (Ag.) Hamel.

Chrootheca rupestris Hansgirg, *Oesterr. Bot. Zeitschr.* 36: 110. 1886. *C. monococca* var. *rupestris* Hansgirg, *Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl.*, 1891(1): 354. 1891. *C. monococca* b. *rupestris* Hansgirg, *Prodr. Algenfl. Böhmen* 2: 135. 1892. *C. monococca* f. *rupestris* Hansgirg ex Forti, *Syll. Myxophyc.*, p. 31. 1907. —Type from Bohemia: Chuchelbad, *A. Hansgirg*, Nov. 1885 (W) = *ASTEROCYTIS ORNATA* (Ag.) Hamel.

Chrootheca Willei Gardner, *Mem. New York Bot. Gard.* 7: 3. 1927. —Type from Puerto Rico: Hato Arriba, Arecibo, *N. Wille* 1410 (NY) = *ASTEROCYTIS ORNATA* (Ag.) Hamel.

Clasidium cylindricum Whelden in Polunin, *Bot. Canadian East. Arctic* 2: 26. 1947. —The original description has been designated as the Type = *AMPHITHRIX JANTHINA* (Mont.) Born. & Flah.

Clasidium setigerum var. *rivulare* Hansgirg, *Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl.*, 1890(1): 18. 1890. *C. rivulare* Hansgirg, *Prodr. Algenfl. Böhmen* 2: 125. 1892. —Type from Istria: Strogiano, *A. Hansgirg*, Apr. 1889 (W) = *AMPHITHRIX* sp.

Clathrocystis bolsatica var. *minor* Lemmermann, *Abh. Naturw. Ver. Bremen* 18: 151. 1905. *Microcystis bolsatica* var. *minor* Lemmermann, *Krypt.-Fl. Mark Brandenburg* 3: 77. 1907. *M. bolsatica* f. *minor* Hollerbach, *Acta Inst. Bot. Acad. Sci. U. R. P. S. S.*, ser. 2, Pl. Crypt. 3: 179. 1936. *M. pulvereae* f. *minor* Hollerbach in Elenkin, *Monogr. Algar. Cyanophyc.*, Pars Spec. 1: 123, 124. 1938. —The original description is here designated as the temporary Type = *BACTERIA*.

CLOSTERIOCOCCUS Schmidle, *Allgem. Bot. Zeitschr.* 1905: 64. 1906. —Type species: *C. vinnheimensis* Schmidle, loc. cit. 1906. —The original description is here designated as the temporary Type = *CHLOROPHYCEAE*.

Coccochloris globosa Meneghini, *Mem. R. Accad. Sci. Torino*, ser. 2, 5(Sci. Fis. & Mat.): 46, 69. 1843. *Palmella globosa* Lenormand *pro synonym.* in Meneghini, loc. cit. 1843. *Brachyia globosa* Trevisan, *Sagg. Monogr. Alg. Coccot.*, p. 58. 1848. —Type from France: Vire, *berb. Lenormand* (FI) = *TRACHELOMONAS* sp.

Coccochloris Orsiniana Meneghini, *N. Giorn. de' Letterati* 38: 67. 1839. *Palmella Orsiniana* Kützing, *Tab. Phyc.* 1: 12. 1846. —Type from Italy: "Coccochloris Orsiniana Mgh." (FI) = *FERROBACTERIACEAE*.

Coccocoea viridis Palisot de Beauvois in Link, *Sitzungsber. Ges. Naturf. Fr. Berlin* 1839—59: 12. 1839. —The original description is here designated as the temporary Type = *BOTRYOCOCCUS* sp.

Coccophyllum expallens Link, *Handb. z. Erkenn. Gewächse* 3: 341. 1833. *Protococcus expallens* Rabenhorst, *Deutschl. Krypt.-Fl.* 2(2): 11. 1847. —The original description is here designated as the Type = *CHLOROPHYCEAE*.

COELOMORON Buell, *Bull. Torr. Bot. Club* 65: 379. 1938. —Type species: *C. regularis* Buell, loc. cit. 1938. —Para-topotype from Minnesota here designated as the Type: in Lake of the Isles lagoon, Minneapolis, *M. F. Buell*, *R. L. Cain*, & *M. F. Moore*, 26 Jul. 1938 (FC) = *LAMPROCYSTIS ROSEA* (Kütz.) Dr. & Daily.

Coeelosphaerium compositum Liebetanz, *Bull. Int. Acad. Cracovie, Cl. Sci. Math. & Nat.*, ser. B, 1925: 109. 1925. —The original description is here designated as the temporary Type = *LAMPROCYSTIS ROSEA* (Kütz.) Dr. & Daily.

Coeelosphaerium confertum W. & G. S. West, *Journ. of Bot.* 34: 382. 1896. —Type from Central Africa: Mwanganan river south of Fuladoga, *J. W. Gregory*, 1893 (BIRM) = *LAMPROCYSTIS ROSEA* (Kütz.) Dr. & Daily.

Coeelosphaerium Dicksonii Archer, *Quart. Journ. Microsc. Sci.*, N. S. 19: 440. 1879. —The

original description is here designated as the temporary Type = NOSTOC sp.

Coelosphaerium dubium f. *majus* Thomasson, Sv. Bot. Tidskr. 46: 233. 1952. —Isotype from Sweden: Bessvam, K. Thomasson, 18 Jul. 1951 (DA) = FLAGELLATA.

Coelosphaerium Leloupii Kufferath, Bull. Inst. Roy. Sci. Nat. Belg. 26(2): 5. 1950. —Topotype from Belgium: Boirs-sur-Geer east of Tongeren, L. Brongersma, 26 Sept. 1951 (D, DA, FC) = LAMPROCYSTIS ROSEA (Kütz.) Dr. & Daily. FIG. 363.

Coelosphaerium minutissimum Lemmermann, Ber. Deutsch. Bot. Ges. 18: 98. 1900. —The original description is here designated as the temporary Type = LAMPROCYSTIS ROSEA (Kütz.) Dr. & Daily.

Coelosphaerium minutissimum var. *liliaceum* Kufferath, Bull. Soc. Roy. Bot. Belg. 74: 95. 1942. —The original description is here designated as the Type = BACTERIA.

LEMMERMANNI Elenkin, Acta Inst. Bot. Acad. Sci. U. R. P. S. S., ser. 2, Pl. Crypt. 1: 25. 1933. LEMMERMANNIELLA Geitler, in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, lb: 62. 1942.

—Type species: *Coelosphaerium pallidum* Lemmermann, Bot. Centralbl. 76: 154. 1898. *Lemmermannia pallida* Elenkin, Acta Inst. Bot. Acad. Sci. U. R. P. S. S., ser. 2, Pl. Crypt. 1: 25. 1933. *Lemmermanniella pallida* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, lb: 62. 1942.

—The original description is here designated as the temporary Type = BACTERIA.

COCOTALES Tribus HYDRUREAE Subtribus EUHYDRUREAE Trevisan, Sagg. Monogr. Alg. Coccot., p. 16, 71. 1848. —Type genus: HYDRURUS Agardh, Syst. Algar., p. xviii. 1824. —Type species: *Conferva foetida* Villars, Hist. Pl. Dauphiné 3: 1010. 1789. *Ulva foetida* Vaucher, Hist. Conf. d'Eau Douce, p. 244. 1803. *Rivularia foetida* Lamarck & De Candolle, Fl. Franc., ed. 3, 2: 5. 1805. *Hydrurus Vaucheri* Agardh, Syst. Algar., p. 24. 1824. *Bangia foetida* Sprengel, Linn. Syst. Vegetab. 4(1): 361. 1827. *Girodella foetida* Gaillon, Aperçu d'Hist. Nat., p. 35. 1833. *Hydrurus foetidus* Trevisan, Sagg. Monogr. Alg. Coccot., p. 75. 1848. —The original description is here designated as the temporary Type = PALMELLA MYOSURUS (Ducluz.) Lyngb.

Conferva ornata Agardh, Syst. Algar., p. 104. 1824. *Asterocystis ornata* Hamel, Rév. Algol. 1: 451. 1924. *Goniotrichum ornatum* Bornet pro synonym. in Hamel, loc. cit. 1924. —Type labeled "Conf. ornata ded. Agardh" (S) = ASTEROCYSTIS ORNATA (Ag.) Hamel. FIG. 304.

CRYPTELLA Pascher, Jahrb. f. Wiss. Bot. 71(3): 459. 1929. —Type species: *C. cyanophora* Pascher, loc. cit. 1929. —The original description is here designated as the temporary Type = FLAGELLATA.

Cryptococcus brunneus Kützing, Sp. Algar., p. 146. 1849. —Type from Italy: in fontibus di Acqua Santa, Meneghini 2 (L) = BACTERIA.

Cryptococcus coccineus Kützing, Sp. Algar., p. 146. 1849. —Type from Italy: in fonte presso la Capella ai Bagni di Armajolo (L) = BACTERIA.

Cryptococcus guttulatus Robin, Hist. Nat. Végét. Parasit., Atlas p. 7, pl. 3, fig. 5, pl. 6, fig. 2. 1853. —The original description is here designated as the temporary Type = BACTERIA.

Cryptococcus lobatus Roemer, Alg. Deutschl., p. 72. 1845. —The original description is here designated as the temporary Type = BACTERIA.

Cryptococcus major Kützing in Meneghini, Conspect. Algol. Eugén., p. 323. 1837. —Type from the Euganean springs, Italy: ad superficiem aquae etc., Meneghini (L) = FLAGELLATA.

Fam. CRYPTOCOCCEAE Kützing, Phyc. Gener., p. 147. 1843. —Type genus: CRYPTOCOC-CUS Kützing, Algar. Aq. Dulc. Germ. Dec. 3: 28. 1833. —Type species: *C. mollis* Kützing, loc. cit. 1833. —Type from Germany: Schleusingen, 6 Mar. 1832 (L) = BACTERIA and FUNGI.

Cryptococcus natans Kützing, Sp. Algar., p. 146. 1849. —Type from Holland: in superf. aqua, van den Bosch 259 (L) = BACTERIA.

Cryptococcus sanguineus Kützing, Sp. Algar., p. 891. 1849. —Type from Holland: in limo maritimo, van den Bosch 471 (L) = LAMPROCYSTIS ROSEA (Kütz.) Dr. & Daily.

CYANARCUS Pascher, Ber. Deutsch. Bot. Ges. 32: 351. 1914. —Type species: *C. hamiformis* Pascher, loc. cit. 1914. —The original description is here designated as the temporary Type = BACTERIA.

Cyanococcus pyrenogerus Hansgirg, Beih. z. Bot. Centralbl. 18(2): 521. 1905. The original description is here designated as the temporary Type = BANGIACEAE or "synchronose" according to Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, lb: 224. 1942.

CYANODICTYON Pascher, Ber. Deutsch. Bot. Ges. 32: 351. 1914. —Type species: *C. endophyticum* Pascher, loc. cit. 1914. —The original description is here designated as the temporary Type = degenerate trichomes of NOSTOCACEAE.

CYANOPHORA Korschikov, Arch. Russes Protistol. 3(1—2): 71. 1924. —Type species: *C. paradoxa* Korschikov, loc. cit. 1924. —The original description is here designated as the temporary Type = FLAGELLATES.

CYANOPTYCHE Pascher, Jahrb. f. Wiss. Bot. 71(3): 459. 1929. —Type species: *C. Gloeocystis* Pascher, ibid. p. 460. 1929. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

CYANOTHECA Pascher, Ber. Deutsch. Bot. Ges. 32: 351. 1914. —Type species: *C. longipes* Pascher, loc. cit. 1914. —The original description is here designated as the temporary Type = FLAGELLATA or FUNGI.

Cylindrocystis Le-Normandii Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 92. 1843. —Type from France: Falaise, herb. Lenormand (FI) = spores of ANABAENA OSCILLARIOIDES Bory.

CYSTOCOCCUS Nägeli, Gart. Einzell. Alg., p. 84. 1849. —Type species: *C. humicola* Nägeli, ibid. p. 85. 1849. *Chlorococcum humicola* Rabenhorst, Fl. Eur. Algar. 3: 58. 1868. *Protococcus viridis* var. *humicola* Wolle, Fresh-w. Alg. U. S., p. 182. 1887. —Type from Switzerland: Zürich, Burgholzli, am Fusse einer Buche auf feuchter Erde, Nägeli, Feb. 1846 (ZT) = *STICHOCOCCUS SUBTILIS* (Kütz.) Klerck.

Dactylococcopsis acicularis Lemmermann, Ber. Deutsch. Bot. Ges. 18: 309. 1900. —The original description is here designated as the temporary Type = *ANKISTRODESMUS FALCATUS* (Corda) Ralfs.

Dactylococcopsis acicularis var. *grandis* Frémy, Arch. de Bot. Caen 3 (Mem. 2): 8. 1930. —The original description is here designated as the temporary Type = *ANKISTRODESMUS FALCATUS* (Corda) Ralfs.

Dactylococcopsis africana G. S. West, Journ. Linn. Soc. Bot. 38: 184. 1907. —Type from Lake Victoria Nyanza: in plankton near Bukoba, W. A. Cunningham 252, 21 Apr. 1905 (in the slide collection, BIRM) = *ANKISTRODESMUS FALCATUS* (Corda) Ralfs.

Dactylococcopsis arcuata Gardner, Mem. New York Bot. Gard. 7: 3. 1927. —Type from Puerto Rico: Caguas, N. Wille 439c (NY) = *PLECTONEMA NOSTOCORUM* Born. FIG. 365.

Dactylococcopsis Echinii Rosenvinge, K. Danske Videnskab. Selsk., Biol. Medd. 11(7): 10. 1934. —The original description is here designated as the temporary Type = *FUNGI* or *CHLOROPHYCEAE*.

Dactylococcopsis fascicularis Lemmermann, Bot. Centralbl. 76: 153. 1898. —The original description is here designated as the temporary Type = *ANKISTRODESMUS FALCATUS* (Corda) Ralfs.

Dactylococcopsis irregularis G. M. Smith, Ark. f. Bot. 17(13): 6. 1922. —The original description is here designated as the temporary Type = *ANKISTRODESMUS FALCATUS* (Corda) Ralfs.

Dactylococcopsis libyca Marchesoni, Mem. Ist. Ital. Idrobiol. Milano 3: 445. 1947. —Type from Libya: in lacubus salatis Murzuch, R. Cort, May 1933 (DA) = *FUNGUS SPORES*.

Dactylococcopsis mucicola Hustedt, Hedwigia 48: 140. 1908. —The original description is here designated as the temporary Type = *ANKISTRODESMUS FALCATUS* (Corda) Ralfs.

Dactylococcopsis pectinatelophila West, Journ. & Proc. Asiatic Soc. Bengal, N. S., 7: 83. 1911. —The original description is here designated as the temporary Type = *CHLOROPHYCEAE*.

Dactylococcopsis rhabdidioides Hansgirg, Notarisia 3: 540. 1888. —Type from Bohemia: Schanzgräben von Prag, A. Hansgirg, Nov. 1883 (W) = spores of *STICHOCOCCUS SUBTILIS* (Kütz.) Klerck. FIG. 359.

Dactylococcopsis rhabdidioides f. *falciformis* Printz, K. Norske Vidensk. Selsk. Skr. 1920(1): 35. 1920. —The original description is here designated as the temporary Type = *ANKISTRODESMUS FALCATUS* (Corda) Ralfs.

Dactylococcopsis rhabdidioides f. *mucicola* Frémy, Arch. de Bot. Caen 3 (Mem. 2): 8. 1930. —The original description is here designated as the temporary Type = *ANKISTRODESMUS FALCATUS* (Corda) Ralfs.

Dactylococcopsis rhabdidioides f. *subtortuosa* Printz, K. Norske Vidensk. Selsk. Skr. 1920(1): 35. 1920. —The original description is here designated as the temporary Type = *ANKISTRODESMUS FALCATUS* (Corda) Ralfs.

Dactylococcopsis Hansgirg, Notarisia 3: 590. 1888. —Type species: *D. rupestris* Hansgirg, loc. cit. 1888. —Type from Bohemia: Karlstein, A. Hansgirg, Jul. 1884 (W) = spores of *STICHOCOCCUS SUBTILIS* (Kütz.) Klerck.

Dactylococcopsis rupestris f. *sigmoides* Ley, Bot. Bull. Acad. Sinica 2: 237. 1948. —The original description is here designated as the temporary Type = primordia of *CHLOROPHYCEAE*.

KERATOCOCCUS Pascher, Süßwasserfl. 5 (Chlorophyc. 2): 216. 1915. —Type species: *Dactylococcus caudatus* Hansgirg, Physiol. & Algal. Stud., p. 86. 1887. *Keratococcus caudatus* Pascher, Süßwasserfl. 5 (Chlorophyc. 2): 216. 1915. —Type from Bohemia: Horovice, A. Hansgirg, Aug. 1884 (W) = spores of *STICHOCOCCUS SUBTILIS* (Kütz.) Klerck.

Dactylococcus caudatus var. *minor* Hansgirg, Prodr. Algenfl. Böhmen 1(2): 146. 1888. —Type from Bohemia: Hohenfurth, A. Hansgirg, Aug. 1884 (W) = spores of *STICHOCOCCUS SUBTILIS* (Kütz.) Klerck.

Dactylococcus rhabdidioides Hansgirg, Oesterr. Bot. Zeitschr. 33: 122. 1887; Physiol. & Algal. Stud., p. 93. 1887. *Keratococcus rhabdidioides* Pascher, Süßwasserfl. 5 (Chlorophyc. 2): 218. 1915. —Type from Bohemia: Mummelfall, A. Hansgirg, Jul. 1886 (W) = spores of *STICHOCOCCUS SUBTILIS* (Kütz.) Klerck.

Dactylothece macrococca Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 323. 1891. —Type from Bohemia: Nieder- und Mittelgrund, A. Hansgirg (W) = palmelloid *STICHOCOCCUS SUBTILIS* (Kütz.) Klerck.

Dermocarpa fossae Fjerdingstad, Dansk Bot. Ark. 14(3): 34. 1950. —The original description is here designated as the temporary Type = *CHARACIOPSIS* sp.

DISCERAE A. & C. Morren, Rech. Rubéf. des Eaux, p. 37. 1841. —Type species: *D. purpurea* A. & C. Morren, loc. cit. 1841. —The original description is here designated as the temporary Type = FLAGELLATES.

Endonema gracile Pascher, Jahrb. f. Wiss. Bot. 70: 347. 1929. *Pascherinema gracile* J. de Toni, Noter. Nomencl. Algol. 8. 1936. —The original description is here designated as the temporary Type = FUNGI.

ENDONEMATACEAE Pascher, Jahrb. f. Wiss. Bot. 70: 346. 1929. *PASCHERINEMATACEAE* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, lb: 99. 1942. —Type genus: *ENDONEMA* Pascher, Jahrb. f. Wiss. Bot. 70: 346. 1929. *PASCHERINEMA* J. de Toni, Noter. Nomencl. Algol. 8. 1936. —Type species: *Endonema moniliforme* Pascher, Jahrb. f. Wiss. Bot. 70: 346. 1929. *Pascherinema moniliforme* J. de Toni, Noter. Nomencl. Algol. 8. 1936. —The original description is here designated as the temporary Type = FUNGI.

Entophysalis zonata Gardner, Univ. Calif. Publ. Bot. 13: 369. 1927. —Type from Fukien province, China: Kushan near Foochow, H. H. Chung F617, Sept. 1926 (FH) = CAPSOSIRA BREBISONII Kütz. FIG. 373.

ERNSTIELLA Chodat, Bull. Soc. Bot. Genève, ser. 2, 3: 126. 1911. —Type species: *E. rufa* Chodat, loc. cit. 1911. —The original description is here designated as the temporary Type = AMPHITHRIX sp.

ERYTHROCONIS Oersted, Naturh. Tidsskr. Kjöbenh. 3: 55. 1841. —Type species: *E. littoralis* Oersted, loc. cit. 1841. *Merismopodia littoralis* Rabenhorst, Fl. Eur. Algar. 2: 57. 1865. *Sarcina littoralis* Winter, Rabenh. Krypt.-Fl. 1(1): 50. 1884. *Lamproedia littoralis* de Toni & Trev. in Saccardo, Syll. Fung. 8: 1049. 1889. —Type from Denmark: Kallebodstrand (C) = ERYTHROCONIS LITTORALIS Oersted.

Encapsis minusa Fritsch, Nat. Antarctic Exped. (1901—04), Nat. Hist. 6 (Freshw. Alg.): 25. 1912. —Type from Antarctica: Cape Adare, 9 Jan. 1902 (in the collection of F. E. Fritsch) = BACTERIA.

Glaucocystis cingulata Bohlin, Bih. K. Sv. Vet.-Akad. Handl. 23(Afd. 3, 7): 13. 1897. —The original description is here designated as the temporary Type = OOCYSTACEAE.

Glaucocystis duplex Prescott, Farlowia 1: 371. 1944. —The original description is here designated as the temporary Type = OOCYSTACEAE.

GLAUCOCYSTIS Itzigsohn in Rabenhorst, Alg. Eur. 194 & 195: 1935. 1866. *CYANOCYSTIS* Rabenhorst *pro synonym.*, loc. cit. 1866. —Type species: *Glaucocystis nostochinearum* Itzigsohn in Rabenhorst, loc. cit. 1866. *Cyanocystis Itzigsohniana* Rabenhorst *pro synonym.*, loc. cit. 1866. *Oocystis cyanea* Nägeli *pro synonym.* in Rabenhorst, loc. cit. 1866. —Type from Germany: im Grunewald, Berlin, O. Kuntze, Jul. 1864 (PC) = OOCYSTACEAE.

Glaucocystis nostochinearum var. *gigas* Gurwinski, Bull. Acad. Sci. Cracovie, Cl. Sci. Math. & Nat., 1909: 543. 1909. —The original description is here designated as the temporary Type = OOCYSTACEAE.

Glaucocystis nostochinearum f. *immanis* Schmidle, Engler Bot. Jahrb. 23: 79. 1902. —Type from Lake Nyasa: Mbasifluss, Fulleborn, 27 Apr. 1899 (ZT) = OOCYSTACEAE.

Glaucocystis oocystiformis Prescott, Farlowia 1: 372. 1944. —The original description is here designated as the temporary Type = OOCYSTACEAE.

GLAUCOSPHAERA Korshikov, Arch. f. Protistenk. 70: 222. 1930. —Type species: *G. vacuolata* Korshikov, loc. cit. 1930. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Gloeocapsa ampla Kützing, Phyc. Gener., p. 174. 1843. *Bichatia ampla* Trevisan, Nomencl. Algar. 1: 60. 1845. *Gloeocystis ampla* Rabenhorst, Krypt.-Fl. Sachsen 1: 128. 1863. *Pleurococcus amplus* Rabenhorst, Fl. Eur. Algar. 3: 29. 1868. —Type from Germany: Nordhausen, in herb. Kützing (L) = palmelloid FLAGELLATES. .FIG. 351.

Gloeocapsa conspiciua Reinsch, Algenfl. Mittl. Th. Franken, p. 33. 1867. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Gloeocapsa dubia Wartmann in Rabenhorst, Alg. Eur. 109—110: 1092. 1861. *Bichatia dubia* Richter in Kuntze, Rev. Gen. Pl. 2: 886. 1891. *Gloeotheca dubia* Geitler, Rabenh. Krypt.-Fl. 14: 216. 1932. —Type from Switzerland: St. Gallen, Wartmann (FC) = ASTEROCYTIS ORNATA (Ag.) Hamel. FIG. 308.

Gloeocapsa fenestralis Kützing, Phyc. Gener., p. 173. 1843. *Bichatia fenestralis* Trevisan, Sagg. Monogr. Alg. Coccol., p. 63. 1848. *Gloeocystis fenestralis* A. Braun in Rabenhorst, Algen Eur. 246—248: 2468. 1876. *Gloeocapsa montana* f. *fenestralis* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec., 1: 226. 1938. —Type from Germany: an Mistbeet-Fenstern, Nordhausen, F. T. Kützing (L) = STICHOCOCCUS BACILLARIS Näg.

GLOEOTHECE Sect. *CHROMOTHECE* Kirchner in Engler & Prantl, Natürl. Pflanzenfam., ed. 1, 1a: 55. 1898. *GLOEOTHECE* Subgen. *CHROMOTHECE* Kirchner ex Forti, Syll. Myxophyc., p. 65. 1907. —Type species: *Gloeocapsa monococca* Kützing, Phyc. Gener., p. 175. 1843. *Bichatia monococca* Trevisan, Nomencl. Algar. 1: 61. 1845. *Gloeocapsa monococca* β *cohaerens* Kützing, Tab. Phyc. 1: 18. 1846. *Palmogloea monococca* Kützing, Sp. Algar., p. 229. 1849. *P. monococca* α *aeruginea* Kützing,

loc. cit. 1849. *Gloeotheca monococca* Rabenhorst, Fl. Eur. Algar. 2: 62. 1865. *Chrootheca monococca* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 354. 1891. —Type from Istria: in den Cataracten des Boschetto, Triest, herb. Kützing (L) = *ASTEROCYTIS ORNATA* (Ag.) Hamel.

Gloeocapsa stillicidiorum Kützing, Phyc. Gener., p. 173. 1843. *Bichatia stillicidiorum* Trevisan, Nomencl. Algar. 1: 62. 1845. —Type from Germany: Steinmühle Hercyniae, F. T. Kützing (L) = *primordia* of *CHLOROPHYCEAE* (*STIGEOCLONIUM?*). FIG. 350.

Gloeocapsa uvaeformis Roemer, Alg. Deutschl., p. 63. 1845. *Bichatia uvaeformis* Trevisan, Sagg. Monogr. Alg. Coccot., p. 67. 1848. —The original description is here designated as the temporary Type = *CHLOROPHYCEAE*.

Gloeocapsa zostericola Farlow, Bull. Torr. Bot. Club 9: 68. 1882. —An isotype: Woods Hole, Massachusetts, W. G. Farlow (S) = *DINOFLAGELLATA*.

Gloeochaete bicornis Kirchner, Jahresh. Ver. Vaterl. Naturk. Württemb. 44: 165. 1888. —The original description is here designated as the temporary Type = *CHLOROPHYCEAE*.

GLOECHAETE Lagerheim, Öfers. K. Sv. Vet.-Akad. Förh. 40(2): 39. 1883. —Type species: *G. Witrockiana* Lagerheim, loc. cit. 1883. —The original description is here designated as the temporary Type = *CHLOROPHYCEAE*.

Gloeococcus agilis Grunow in Rabenhorst, Fl. Eur. Algar. 3: 36. 1868. —Type from Austria: in einem kleinen Bache bei Berndorf, A. Grunow, 1 Sept. 1856 (PC) = *FLAGELLATES*.

Gloeocystis gigas var. *rufescens* A. Braun ex Hansgirg, Prodr. Algenfl. Böhmen 1: 136. 1886. —Type from Bohemia: Pisek, A. Hansgirg (W) = *palmelloid FLAGELLATES*.

Gloeocystis marina Hansgirg, Oesterr. Bot. Zeitschr. 39: 42. 1889. —Type from Istria: Pola, A. Hansgirg, 1888 (W) = basal parts of *MONOSTROMA* sp. FIG. 343.

Gloeocystis scopulorum Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 239. 1892. —Type from Croatia: Zengg, A. Hansgirg, 1891 (W) = *primordia* of *CHLOROPHYCEAE*. FIG. 342.

Gloeotheca Baileyana Schmidle, Flora 82: 312. 1896. —Type from Queensland, Australia: Jenkins quarry, Bundamba, W. J. Byram (ZT) = *palmelloid FLAGELLATES*. FIG. 340.

Gloeotheca cystifera var. *maxima* West, Trans. Roy. Microsc. Soc. 1892: 743. 1892. *G. rupestris* var. *maxima* West ex Forti, Syll. Myxophyc., p. 64. 1907. *G. rupestris* f. *maxima* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 250. 1938. —Type from the English Lake District: Bowness (BIRM) = *ANABAENA FLOS-AQUAE* (Lyngb.) Bréb., spores.

Gloeotheca linearis f. *angusta* West, Proc. Roy. Irish Acad. 31: 40. 1912. —Type from Ireland: Lough Gall, Achill island (BIRM) = *BACTERIA*.

Gloeotheca magna Wolle, Bull. Torr. Bot. Club 6: 138. 1877. —Type from Pennsylvania: with *Micrasterias multifida* Wolle in a Desmidiaceen-Ausammlung (Rabenh., Alg. Eur. 2510, FC) = *palmelloid CHLOROPHYCEAE*.

Gloeotheca minor Beck in Becker, Hernstein in Niederösterreich, II, Fl. des Gebietes, p. 266. 1886. —Type from Hernstein, Lower Austria: hint. Grillenbergthal, Beck 365 (in the Cryptogamic Herbarium, Charles University, Prague) = *BACTERIA*. FIG. 341.

Gloeotheca trichophila Rabenhorst, Hedwigia 1867: 49. 1867. —Type from England: London, an Chignon-Haaren, Beigel (with *Pleurococcus Beigelii* in Rabenh. Alg. 2053, NY) = *BACTERIA*.

Gloeotheca violacea Rabenhorst, Fl. Eur. Algar. 2: 61. 1865. —The original description is here designated the temporary Type = *BACTERIA*.

GLOIODICTYON Agardh, Consp. Crit. Diatomac. 2: 25. 1830. —Type species: *G. Blythii* Agardh, ibid. p. 26. 1830. *Schizonema reticulatum* Agardh pro synonym., loc. cit. 1830. —Type from Norway: Tofledaljan, Nowi Trondhjem, Blytt (LD) = sterile *ZYGNEMA* sp.

Gloionema globiferum Agardh, Consp. Crit. Diatomac. 2: 31. 1830. —Type from Traneberg (LD) = *DIATOMS* in the sheaths of *OPHRYDIUM* sp.

Gloionema Leibleinii Agardh, Consp. Crit. Diatomac. 2: 31. 1830. —Type: *Leiblein* 17 (LD) = *DIATOMS*.

GLOIONEMA Agardh, Dispos. Algar. Suec., p. 45. 1882. —Type species: *G. paradoxum* Agardh, loc. cit. 1812. —Type from Sweden: Jäder (LD) = *EGGS OF ANIMALS*.

Gloionema vermiculare Agardh, Flora 10(2): 630. 1827. —Type from Bohemia: Carlsbad (LD) = *DIATOMS*.

Gomphosphaeria aurantiaca Bleisch in Rabenhorst, Alg. Eur. 181—182: 1810. 1865. *G. aponina* var. *aurantiaca* Bleisch ex Kirchner, Krypt.-Fl. Schlesien 2(1): 255. 1878. *G. aponina* f. *aurantiaca* Forti, Syll. Myxophyc., p. 98. 1907. —Type from Silesia (Poland): auf dem Galgenberge bei Strehlen, Bleisch (L) = *BOTRYOCOCCUS BRAUNII* Kütz.

LAMPROPEDIA Schröter, Pilze Schlesiens 1: 151. 1886. —Type species: *Gonium hyalinum* Ehrenberg, Abh. K. Akad. Wiss. Berlin 1831: 75. 1832. *Merismopoedia hyalina* Kützing, Phyc. Germ., p. 142. 1845. *Sarcina hyalina* Winter, Rabenh. Krypt.-Fl. 1(1): 51. 1884. *Lampropedia hyalina* Schröter, Pilze Schlesiens 1: 151. 1886. —The original description is here designated the temporary Type = *BACTERIA*.

Gonium punctatum Ehrenberg, Abh. K. Akad. Wiss. Berlin 1833: 250. 1834. *Gonidium*

punctatum Meneghini, Linnaea 14: 214. 1840. —The original description is here designated as the temporary Type = FLAGELLATES.

Haematococcus arenarius Hassall, Hist. Brit. Freshw. Alg. 1: 330. 1845. *Bichasia arenaria* Trevisan, Sagg. Monogr. Alg. Coccot., p. 66. 1848. *Gloeocapsa arenaria* Rabenhorst, Fl. Eur. Algar. 2: 39. 1865. —Type from England: Tunbridge Wells common, Dec. 1844 (BM) = palmelloid *STICHOCOCCUS SUBTILIS* (Kütz.) Klerck.

Haematococcus atomarius Flotow, Nova Acta Acad. Caes. Leop.-Car. Nat. Cur. 20(2): 424. 1842. *H. pluvialis* var. *atomarius* Flotow *pro synonym.*, loc. cit. 1842. —The original description is here designated as the temporary Type = *PROTOCOCCUS GREVILLEI* (Ag.) Crouan.

Haematococcus fuliginosus Meneghini, Consp. Algal. Erganz., p. 323. 1837. *Protococcus fuliginus* Lenormand in Kützing, Tab. Phyc. 1: 3. 1846. *Chroococcus fuliginus* Rabenhorst, Fl. Eur. Algar. 2: 34. 1865. —Kützing's notation of the original locality is obviously an editorial error, since his name is based upon the same specimen as is Meneghini's. The Type is from Italy: aquis thermalibus Euganeis (L) = BACTERIA. FIG. 370.

COCOTALES Tribus *PROTOCOCCAE* Subtribus *HAEMATOCOCCAE* Trevisan, Sagg. Monogr. Alg. Coccot., p. 16, 37. 1848. —Type genus: *HAEMATOCOCCUS* Agardh, Icon. Alg. Eur., no. 22. 1828—35. Synon.: *GLOIOCOCCUS* Shuttleworth, Bibl. Univ. Genève 25: 405. 1840. —Type species: *Haematococcus Grevillei* Agardh, Icon. Alg. Eur., no. 23. 1828—35. *Microcystis Grevillei* Kützing, Linnaea 8: 372. 1833. *Gloiooccus Grevillei* Shuttleworth, Bibl. Univ. Genève 25: 405. 1840. *Protosphaeria Grevillei* Trevisan, Sagg. Monogr. Alg. Coccot., p. 28. 1848. *Protococcus Grevillei* Crouan fr., Fl. Finistère, p. 109. 1867. —The type species of *Haematococcus* Ag. was designated by Silva & Starr, Sv. Bot. Tidskr. 47(2): 246 (1953). The Type is from Scotland: "Palmella nivalis" det. Greville, island of Lismore, *Carmichael* (K) = *PROTOCOCCUS GREVILLEI* (Ag.) Crouan. FIG 372.

Haematococcus insignis Hassall, Hist. Brit. Freshw. Alg. 1: 324. 1845. *Urococcus insignis* Hassall ex Kützing, Sp. Alg., p. 207. 1849. *Hassallia insignis* Trevisan, Sagg. Monogr. Alg. Coccot., p. 67. 1848. —The original description is here designated as the temporary Type = encysted FLAGELLATES.

Haematococcus mucosus Morren, Rech. Rubéf. des Eaux, p. 104. 1841. *Microcystis Morrenii* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 87. 1843. *Bichasia mucosa* Trevisan, Nomencl. Algar. 1: 61. 1845. —The original description is here designated as the temporary Type = FLAGELLATES.

MICROCYSTACEAE Elenkin, Acta Inst. Bot. Acad. Sci. U. R. S. S., II, 1: 19. 1923. *MICROCYSTIDACEAE* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 93. 1938. —Type genus: *MICROCYSTIS* Kützing, Linnaea 8: 372. 1833. *MICROCYSTIS* Unterabtheilung *MICROCYSTIS* Kützing, Tab. Phyc. 1: 7. 1846. *MICROCYSTIS* Subgenus *EUMICROCYSTIS* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 67. 1923. —Type species: *Haematococcus Noltii* Agardh, Icon. Alg. Eur., no. 22. 1828—35. *Microcystis Noltii* Kützing, Linnaea 8: 372. 1833. —Geitler in Engler & Prand, Natürl. Pflanzenfam. ed. 2, lb: 46 (1942) does not irrevocably designate *M. aeruginosa* as the "Leitart" of *Microcystis* Kütz. Kützing transferred his *Micraloa aeruginosa* into *Microcystis* ten years after he had described both; in another six years he transferred it into his genus *Polycystis*. The type species designated here is historically the correct one: *Microcystis Noltii* Kütz. Isotypes from Schleswig collected by Nolte are in several herbaria (FC, L, UC) = *EUGLENA* sp.

Haematococcus Orsinii Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 22. 1843. *Protococcus Orsinii* Kützing, Phyc. Germ., 146. 1845. *Protosphaeria Orsinii* Trevisan, Sagg. Monogr. Alg. Coccot., p. 29. 1848. *Chroococcus Orsinii* Rabenhorst, Alg. Eur. 127—128: 1269. 1862. *Chlorococcum Orsinii* Meneghini ex Rabenhorst, Fl. Eur. Algar. 3: 60. 1868. —Isotype from Italy: Acqua Santa, *ex herb. Meneghini* (L) = *EUGLENA* sp.

Haematococcus pluvialis Flotow, Nova Acta Caes. Leop.-Car. Nat. Cur. 20(2): 415. 1842. *Protococcus pluvialis* Kützing, Phyc. Germ., p. 146. 1845. *P. pluvialis* α *leprosus* Kützing, loc. cit. 1845. *Protosphaeria pluvialis* Trevisan, Sagg. Monogr. Alg. Coccot., p. 28. 1848. *Chlamidococcus pluvialis* A. Braun, Betracht. über Erscheinen. Verjüng. i. d. Natur, p. 147. 1849—50. —Topotype from Bohemia: Hirschberg, Flotow (in Rabenh. Alg. 71, FC) = *PROTOCOCCUS GREVILLEI* (Ag.) Crouan.

Haematococcus vesiculosus Morren, Rech. Rubéf. des Eaux, p. 104. 1841. *Coccolchloris vesiculosa* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 70. 1843. —The original description is here designated as the temporary Type = FLAGELLATES.

HETEROCYANOCOCCUS Kufferath, Ann. Crypt. Exot. 2: 51. 1929. —Type species: *H. Haumanii* Kufferath, loc. cit. 1929. —The original description is here designated as the temporary Type = *NOSTOC* sp.

ASTEROCYTIS Gobi, Trudy St. Petersb. Obshech. Estestvoisp. 10: 86. 1879. *GLAUCONEMA* Reinhardt, Algal. Izsladov., p. 240. 1885. *ALLOGONIUM* Sect. *ASTEROCYTIS* Hansgirg, Physiol. & Algal. Stud., p. 109. 1887. *ALLOGONIUM* Subgenus *ASTEROCYTIS* Hansgirg, Notarisia 3: 588. 1888. —Type species: *Hormospora ramosa* Thwaites in Harvey, Phycol. Brit. 4: pl. CCXIII. 1849. *Asterocytis ramosa* Gobi, Trudy St. Petersb. Obshech. Estestvoisp. 10: 86. 1879. *Glaucanema*

ramosum Reinhardt, Algol. Izsladov., p. 240. 1885. *Goniotrichum ramosum* Hauck, Meeresalg., p. 519. 1885. *Chroodactylon ramosum* Hansgirg, Ber. Deutsch. Bot. Ges. 3: 19. 1885. *Allogonium ramosum* Hansgirg, Physiol. & Algol. Stud., p. 110. 1887. —The original description is here designated as the temporary Type = *ASTEROCYTIS ORNATA* (Ag.) Hamel.

HYALOCOCCUS Schröter, Pilze Schlesiens 1: 152. 1886. —Type species: *H. pneumoniae* Schröter, loc. cit. 1886. —The original description is here designated as the temporary Type = *BACTERIA*.

Hydrococcus ericetorum Kützing, Phyc. Germ., p. 154. 1845. *Oncobyrsa ericetorum* Rabenhorst, Fl. Eur. Algar. 2: 69. 1865. —Type from the Harz mountains, Germany: am Wege nach Sonderhausen, herb. Kützing (L) = young LICHEN.

Hydrococcus guadelupensis Crouan fr. in Schramm & Mazé, Essai Class. Alg. de la Guadeloupe, p. 29. 1865; idem, p. 67. 1866. *Oncobyrsa guadelupensis* Crouan fr. in Mazé & Schramm, Essai Class. Alg. Guadeloupe, ed. 2, p. 13. 1870—77. —Type from La Guadeloupe: Basse Terre, Mazé & Schramm (PC) = *NOSTOC SPHAERICUM* Vauch.

Hydrococcus lacustris Brügger, Jahresber. Naturf. Ges. Graubündens, N. F., 8: 250. 1863. —The original description is here designated as the temporary Type = *CHLOROPHYCEAE*.

Hyella infestans Howe, Mem. Torrey Bot. Club 15: 14. 1914. *Myxobyella infestans* Geitler, Rabenh. Krypt.-Fl. 14: 381. 1932. —Type from Peru: Bay of Sechura, Coker 157pp (NY) = *ERYTHROCLADIA* sp.

Hyella terrestris Chodat, Bull. Soc. Bot. Gèneve, ser. 2, 13: 113. 1921. —The original description is here designated as the temporary Type = *FISCHERELLA AMBIGUA* (Näg.) Gom.

Hyphelia aurantiaca Libert, Crypt. Arduennae 4: 379. 1837. *Chroococcus aurantiacus* de Toni, Malpighia 1: 326. 1887. —Type from Belgium in Libert, Pl. Crypt. Arduennae no. 379 (BR) = *BOTRYDIUM GRANULATUM* (L) Grev. FIG. 355.

Inoderma fontanum Kützing, Phyc. Germ., p. 150. 1845. *Cagniardia fontana* Trevisan, Sagg. Monogr. Alg. Coccot., p. 51. 1848. *Inoderma lamellosum* b. *fontanum* Rabenhorst, Fl. Eur. Algar. 3: 38. 1868. *I. lamellosum* var. *fontanum* Rabenhorst ex Hansgirg, Prodr. Algenfl. Böhmen 1: 140. 1886. —Type from Weissenfels, Germany, in Kützing, Alg. Aq. Dulc. Dec. 4: 39 (L) = *DIATOMS*.

INODERMA Kützing, Alg. Aq. Dulc. Dec. 4: 39. 1833. —Type species: *I. lamellosum* Kützing, loc. cit. 1833. *Cagniardia lamellosa* Trevisan, Sagg. Monogr. Alg. Coccot., p. 51. 1848. —Type from Tennstedt, Germany, in Kützing, Alg. Aq. Dulc. Dec. 4: 40 (L) = *DIATOMS*.

EMBRYOSPHAERIA Trevisan, Sagg. Monogr. Alg. Coccot., p. 36. 1848. —Type species: *Lepra infusionum* Schrank, Neue Ann. der Bot. 1(3): 4. 1794. *Lepraria infusionum* Schrank, Denkschr. K. Akad. Wiss. München 1811: 10. 1811. *Protococcus Monas β aquaticus* Kützing, Linnæa 8: 367. 1833. *Chlorococcum infusionum* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5(Sci. Fis. & Mat.): 9, 27. 1843. *Protococcus minor γ infusionum* Kützing, Tab. Phyc. 1: 3, 1846. *P. Meneghinii* Kützing, Tab. Phyc. 1: 4. 1846. *Protococcus Monas* var. *aquaticus* Kützing ex Trevisan, Sagg. Monogr. Alg. Coccot., p. 26. 1848. *Embryosphaeria Meneghinii* Trevisan, ibid., p. 37. 1848. *Chlorococcum Meneghinii* Brébisson pro synonym. in Trevisan, loc. cit. 1848. *Protococcus infusionum* Kirchner, Krypt.-Fl. Schlesiens 2(1): 103. 1878. *P. viridis* var. *infusionum* Wolle, Fresh-w. Alg. U. S., p. 182. 1887. *Chlorella infusionum* Beijerinck, Bot. Zeit. 48: 758. 1890. *Gloeocystis infusionum* W. & G. S. West, Journ. of Bot. 37: 223. 1899. —The type species for *Embryosphaeria* Trevis. was designated by Silva & Starr, Sv. Bot. Tidskr. 47(2): 246 (1953). The original description of *Lepra infusionum* Schrank is here designated as the temporary Type of this species = *FLAGELLATES*.

Lepraria kermesina Wrangel, K. Vetensk.-Acad. Handl. 1823: 52. 1823. *Sphaerella Wrangelii* Sommerfelt, Mag. f. Naturvid. 4: 252. 1824. *Protococcus kermesinus* Agardh, Nova Acta Acad. Caes. Leop.-Car. Nat. Cur. 12(2): 749. 1825. *Byssus kermesina* Wahlenberg, Fl. Suecica 2: 924. 1833. *Haematococcus kermesinus* Flotow, Nova Acta Acad. Caes. Leop.-Car. Nat. Cur. 20(2): 426. 1842. —Type from Sweden: "Lepr. Kermesina. Wr. Act. Holm." in herb. Agardh (LD) = primordia of *CHLOROPHYCEAE* (*STIGEOCLONIUM*?).

Lichen roseus Schreber, Spicil. f. Lips., p. 140. 1771. *Lepra rosea* Hoffman pro synonym., Enum. Lich. 1: 5. 1784. *Byssus rosea* Retz, Fl. Scand. Prodr., ed. al. p. 308. 1795. *Lepraria rosea* Acharius, Lichenogr. Suec. Prodr., p. 9. 1798. *Tubercularia rosea* Persoon, Syn. Meth. Fung. 1: 114. 1810. *Palmella rosea* Lyngbye, Tent. Hydrophyt. Dan., p. 207. 1819. *Coccochloris rosea* Sprengel, Linn. Syst. Veget., ed. 16, 4(1): 373. 1827. *Protococcus roseus* Corda in Sturm, Deutschl. Fl., Abt. 2, 6: 37. 1833. *Microcystis rosea* Kützing, Linnæa 8: 373. 1833. *Coccophysium cobalinum* Link, Handb. Erkenn. Gewächse 3: 342. 1833. *Ulosporium roseum* Link, ibid. 3: 488. 1833. *Haematococcus roseus* Meneghini, Consp. Algol. Egan., p. 323. 1837. *Protococcus cobaltinus* Rabenhorst, Deutschl. Krypt.-Fl. 2 (2): 11. 1847. —The original description is here designated as the temporary Type = *FUNGI*.

COCCOPHYSIUM Link, Abh. K. Akad. Wiss. Berlin 1824: 184. 1826. —Type species: *Lichen rubens* Hoffman, Enum. Lich. 1: 4. 1784. *Lepraria rubens* Acharius, Meth. Lich. 1: 6. 1803. *Monilia cinnabarina* Sprengel, Fl. Halens., p. 386. 1806. *Globulina rubens* Turpin, Dict. Sci. Nat. 65 (Végét. Acot.): pl. 6, fig. 7. 1816—29; Turpin, Mém. Mus. d'Hist. Nat. Paris 14: 26, 63. 1827.

- Conferva rubens* Sommerfelt, Suppl. Fl. Lapon., p. 194. 1826. *Protococcus rubens* Kützling, Linnaea 8: 369. 1833. —The original description is here designated as the temporary Type = FUNGI.
- Limnodictyon obscurum* Dickie, Journ. Linn. Soc. Bot. 18: 125. 1880. —Type from Brazil: Obydos, J. W. H. Trail, 6 Feb. 1874 (BM) = CHLOROPHYCEAE.
- LIMNODICTYON** Kützing in Roemer, Alg. Deutschl., p. 61. 1845. —Type species: *L. Roemerianum* Kützing in Roemer, loc. cit. 1845. *Palmogloea Roemeriana* Kützing, Phyc. Germ., p. 153. 1845. *Protococcus infusionum* var. *Roemerianus* Hansgirg, Prodr. Algenfl. Böhmen 1: 143. 1886. —Type from Osterode, Germany: Römer 142 in herb. Kützing (L) = EUGLENA sp. FIG. 344.
- LITHOMYXA** Howe, U. S. Geol. Surv. Prof. Paper 170: 63. 1932. —Type species: *L. calcigena* Howe, loc. cit. 1932. —Type from West Virginia: in Furnace creek, above Harpers Ferry, D. White, C. B. Read & M. A. Howe, 7 Dec. 1930 (NY) = FERROBACTERIACEAE.
- Lithomyxa calcigena* f. *ferriifera* Howe, U. S. Geol. Surv. Prof. Paper 170: 63. 1932. —Type from West Virginia: Furnace creek, above Harpers Ferry, D. White, C. B. Read & M. A. Howe, 7 Dec. 1930 (NY) = FERROBACTERIACEAE.
- Marsoniella andicola* Tutin, Trans. Linn. Soc. London, ser. 3, 1(2): 200. 1940. —Type from Lake Titicaca, Bolivia: Lagunilla Lagunilla (BM) = CHARACIUM sp.
- Marsoniella carpetana* Gonzalez Guerrero, Bol. R. Soc. Española Hist. Nat. 29: 251. 1929. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Merismopoedia aeruginea* b. *violacea* Rabenhorst, Fl. Eur. Algar. 2: 57. 1865. —Type from France: Falaise, de Brébisson (FC) = ERYTHROCONIS LITTORALIS Oerst.
- Merismopoedia aurantiaca* Maggiora, Giorn. R. Soc. Ital. d'Igiene 2: 335. 1889. *Pediococcus Maggiorae* Trevisan in Saccardo, Syll. Fung. 8: 1051. 1889. —The original description is here designated at the Type = BACTERIA.
- Merismopoedia chondroidea* Wittrock in Wittrock & Nordstedt, Alg. Exs. 4: 200. 1878. —Type from Sweden: ad Upsaliam in fonte Slottsdämmen, V. Wittrock, Jul. 1876 (in Wittrock & Nordst., Alg. Exs. 200, S) = ERYTHROCONIS LITTORALIS Oerst.
- Merismopoedia elegans* var. *mandalensis* Wille, Nyt Mag. Naturvid. 38(1): 5. 1900. —The original description is designated here as the temporary Type = ERYTHROCONIS LITTORALIS Oerst.
- Merismopoedia Marssonii* Lemmermann, Ber. Deutsch. Bot. Ges. 18: 31. 1900. —The original description is here designated as the temporary Type = ERYTHROCONIS LITTORALIS Oerst.
- Merismopoedia Massartii* Kufferath, Bull. Soc. Roy. Bot. Belg. 74: 95. 1942. —The original description is designated here as the temporary Type = ERYTHROCONIS LITTORALIS Oerst.
- Merismopoedia ochracea* Mettenheimer, Abh. Senckenb. Naturf. Ges. 2: 141. 1856. *Lamprospedia ochracea* Trevisan in Saccardo, Syll. Fung. 8: 1049. 1889. —The original description is designated here as the temporary Type = ERYTHROCONIS LITTORALIS Oerst.
- Merismopoedia punctata* var. *vacuolata* Playfair, Proc. Linn. Soc. New South Wales 43: 500. 1918. —The original description is designated here as the temporary Type = ERYTHROCONIS LITTORALIS Oerst.
- Merismopoedia rectangularis* Schiller, Sitzungsber. Oesterr. Acad. Wiss., Math.-Nat. Kl., I, 163: 127. 1954. —The original description is here designated as the temporary Type = BACTERIA.
- Merismopoedia Reitenbachii* Caspary, Schrift. Phys.-Ökon. Ges. Königsberg 15: 104. 1874. *Sarcina Reitenbachii* Winter, Rabenh. Krypt.-Fl. 1(1): 50. 1884. *Lamprospedia Reitenbachii* de Toni & Trevisan in Saccardo, Syll. Fung. 8: 1048. 1889. —Type from East Prussia: Presberg bei Goldap, R. Caspary, 22 Sept. 1874 (L) = ERYTHROCONIS LITTORALIS Oerst. FIG. 300.
- Merismopoedia sinica* Ley, Bot. Bull. Acad. Sinica 1: 271. 1947. —The original description is here designated as the temporary Type = ERYTHROCONIS LITTORALIS Oerst.
- Merismopoedia Trolleri* Bachmann, Zeitschr. f. Hydrol. 1: 350. 1920. —The original description is designated here as the temporary Type = ERYTHROCONIS LITTORALIS Oerst.
- Merismopoedia violacea* Kützing, Sp. Algar., p. 472. 1849. *Agmenellum violaceum* Brébisson pro synon. in Kützing, loc. cit. 1849. *Micraloa violacea* Brébisson pro synon. in Rabenhorst, Fl. Eur. Algar. 2: 57. 1865. *Lamprospedia violacea* de Toni & Trevisan in Saccardo, Syll. Fung. 8: 1048. 1889. *Merismopoedia aeruginea* var. *violacea* Rabenhorst ex Forti, Syll. Myxophyc., p. 107. 1907. —Type from France: Falaise, Brébisson 532 (L) = ERYTHROCONIS LITTORALIS Oerst. FIG. 299.
- Micraloa Pini-turinorum* Biasoletto, Di Alc. Alghe Microsc., p. 48. 1832. *Microbaloa Pinii* Kützing, Tab. Phyc. 1: 9. 1846. *Micraloa Pinii* Kützing ex Trevisan, Sagg. Monogr. Alg. Coccot., p. 38. 1848. —Type from Trieste: Biasoletto (NY) = FLAGELLATES.
- MICRALOA** Biasoletto, Di Alc. Alghe Microsc., p. 44, 46. 1832. **SPHAEROTHROMBIUM** Kützing pro synon., Linnaea 8: 370. 1833. **CALIALOA** Trevisan, Sagg. Monogr. Alg. Coccot., p. 41. 1848. —Type species: *Micraloa protogenita* Biasoletto, Di Alc. Alghe Microsc., p. 44. 1832. *Microbaloa protogenita* Kützing, Phyc. Germ., p. 147. 1845. *Calialoa Meneghinii* Trevisan, Sagg. Monogr. Alg. Coccot., p. 41. 1848. *Microcystis protogenita* Rabenhorst, Fl. Eur. Algar. 2: 51. 1865. *Chlorococcus protogenitus* Rabenhorst, ibid. 3: 58. 1868. *Protococcus protogenitus* Hansgirg, Prodr. Algenfl. Böhmen 1: 144. 1886. *Chroococcus protogenitus* Hansgirg, ibid. 2: 166. 1892. *Protococcus protogenitus* var. *minor* Forti, Syll. Myxophyc., p. 94. 1907. —Type from Trieste: Biasoletto (W) = FLAGELLATA.

Micraloa rosea Kützing, *Linnaea* 8: 371. 1833. *Sphaerobrombium roseum* Kützing *pro synonym.*, *ibid.* 8: 370. 1833. *Cryptococcus roseus* Kützing, *Phyc. Gener.*, p. 149. 1843; Kützing, *Linnaea* 17: 82. 1843. —Type from Germany: ad Charas putridas prope Tennstaedt fl. Halens, Kützing, 1832 (L) = LAMPROCYSTIS ROSEA (Kütz.) Dr. and Daily, *COMB. NOV.*

Micraloa teres Flotow, *Nova Acta Acad. Caes. Leop.-Car. Nat. Cur.* 20(2): 456. 1842. —Topotype from Bohemia: Hirschberg, Flotow (in Rabenh. Alg. 71, FC) = PROTOCOCCUS GREVILLEI (Ag.) Crouan.

Microcystis argentea Schiller, *Sitzungsber. Oesterr. Akad. Wiss., Math.-Nat. Kl.*, I, 163: 116. 1954. —The original description is here designated as the temporary Type = LAMPROCYSTIS ROSEA (Kütz.) Dr. & Daily.

Microcystis austriaca Kützing, *Tab. Phyc.* 1: 7. 1846. *Haematococcus austriacus* Trevisan, *Sagg. Monogr. Alg. Coccot.*, p. 39. 1848. —Type from Austria: Welwitsch (Sonder) (L) = EUGLENA sp.

Microcystis Brebissonii Meneghini, *Mem. R. Accad. Sci. Torino*, ser. 2, 5 (Sci. Fis. & Mat.): 85. 1843. *Bichatia Brebissonii* Trevisan, *Nomencl. Algar.* 1: 60. 1845. *Phytoconis miniata* Brébisson ex Trevisan, *Sagg. Monogr. Alg. Coccot.*, p. 61. 1848. *Gloeocapsa paroliniana* β *Brebissonii* Kützing, *Sp. Algar.*, p. 223. 1849. *Gloeocystis paroliniana* β *grumosa* Brébisson in Rabenhorst, *Fl. Eur. Algar.* 3: 30. 1868. *Gloeocapsa paroliniana* var. *Brebissonii* Hansgirg, *Prodr. Algenfl. Böhmen* 2: 150. 1892. —Type from France: *Palmella miniata* Leibl. *Falaises de la cote du Calvados, Brébisson* (FI) = ASTEROCYSTIS ORNATA (Ag.) Hamel. FIG. 319.

Microcystis chroococcoides var. *minor* Nygaard, *K. Danske Vidensk. Biol. Skr.* 7(1): 178. 1949. —Type from Denmark: Sponderborg, 26 Aug. 1944 (in the slide collection of G. Nygaard) = BACTERIA (LAMPROCYSTIS sp. ?).

Microcystis Donnellii Wolle, *Bull. Torrey Bot. Club* 6: 282. 1879. —Type from Maryland: Garrett county, J. D. Smith, Jul. 1878 (PENN) = a ciliate PROTOZOAN containing ZOOCHLORELLA sp.

Microcystis lobata Dickie, *Journ. Linn. Soc. Bot.* 18: 128. 1880. —Type from the Rio Tapajos, Brazil: J. W. H. Trail 74 (BM) = ANABAENA CIRCINALIS (Kütz.) Rabenh.

Microcystis mellea Meneghini, *Mem. R. Accad. Sci. Torino*, ser. 2, 5 (Sci. Fis. & Mat.): 83. 1843. *Coccolchloris mellea* Brébisson *pro synonym.* in Meneghini, *loc. cit.* 1843. *Palmella mellea* Kützing, *Phyc. Germ.*, p. 149. 1845. *Bichatia mellea* Trevisan, *Nomencl. Algar.* 1: 61. 1845. *Gloeocapsa mellea* Kützing, *Tab. Phyc.* 1: 18. 1846. *Cylindrocystis mellea* Brébisson *pro synonym.* in Kützing, *loc. cit.* 1846. *Palmogloea monococca* β *mellea* Kützing, *Sp. Algar.*, p. 229. 1849. *Gloeotheca mellea* Rabenhorst, *Fl. Eur. Algar.* 2: 62. 1865. *Chrootheca monococca* var. *mellea* Kützing ex Hansgirg, *Prodr. Algenfl. Böhmen* 2: 135. 1892. *Gloeotheca monococca* var. *mellea* Kützing ex Geitler in Pascher, *Süßwasserfl.* 12: 94. 1925. —Paratypes from France: *Coccolchloris mellea* Bréb. *Falaise* (FC, L, S, UC) = ASTEROCYSTIS ORNATA (Ag.) Hamel.

Microcystis merismopedioides Fritsch, *Journ. Linn. Soc. Bot.* 40: 332. 1912. —Type from the South Orkney islands: Point Martin, Scotia bay (in the collection of F. E. Fritsch) = BACTERIA.

Microcystis minor Kützing, *Tab. Phyc.* 1: 9. 1846. *Haematococcus minor* Trevisan, *Sagg. Monogr. Alg. Coccot.*, p. 39. 1848. —Type from the Netherlands: Goes, van den Bosch (L) = EUGLENA sp. FIG. 318.

Microcystis minuta var. *violacea* Lindstedt, *Fl. Mar. Cyanophyc. Schwed. Westküste*, p. 17. 1943. —Type from Sweden: Kristineberg (in the collection of A. Lindstedt) = LAMPROCYSTIS ROSEA (Kütz.) Dr. & Daily. FIG. 316.

Microcystis olivacea Kützing, *Phyc. Gener.*, p. 170. 1843. —Type from Germany: Jever, Jürgens (L) = EUGLENA sp. FIG. 320.

Microcystis parasitica Kützing, *Phyc. Gener.*, p. 170. 1843. *Anacystis parasitica* Trevisan, *Sagg. Monogr. Alg. Coccot.*, p. 35. 1848. *Microcystis pulvereae* f. *parasitica* Elenkin, *Monogr. Algar. Cyanophyc.*, Pars Spec. 1: 124. 1938. —Type from Germany (L) = NOSTOC HEDERULAE Menegh. FIG. 317.

Microcystis rosea Kufferath, *Bull. Soc. Roy. Bot. Belg.* 74: 94. 1942. —The original description is here designated as the Type = LAMPROCYSTIS ROSEA (Kütz.) Dr. & Daily.

Microcystis rufescens Martens ex Wille, *Nyt Mag. Naturv.* 62: 202. 1925. —Type from Arracan, Burma: no. 4819, in herb. Agardh (LD) = EUGLENA sp.

Microcystis stereophysalis Meneghini, *Giorn. Bot. Ital.* I, 1: 297. 1844. *Bichatia stereophysalis* Trevisan, *Nomencl. Alg.* 1: 62. 1845. *Tetraspora stereophysalis* Kützing, *Tab. Phyc.* 1: 20. 1846. —Type from Italy: Ferrara, Felisi (FI) = MONOSTROMA sp.

Microcystis umbrina Kützing, *Linnaea* 8: 373. 1833. *Protococcus umbrinus* Kützing, *Phyc. Gener.*, p. 169. 1843. *Chlorococcum umbrinum* Rabenhorst, *Fl. Eur. Algar.* 3: 60. 1868. —Type from Germany: in cortice Fagi sylvaticae prope Leucopetram (in Kütz. Alg. Aq. Dulc. Dec. 10: 91, L) = PHYTOCONIS BOTRYOIDES (L.) Bory, somewhat parasitized.

MICRODISCUS Steinecke, *Schrift. Phys.-ökon. Ges. Königsberg* 56: 25. 1916. —Type species: *M. parasiticus* Steinecke, *loc. cit.* 1916. —The original description is here designated as the temporary Type = BACTERIA.

Microhaloa aurantiaca Kützing, *Phyc. Germ.*, p. 147. 1845. *Micraloa aurantiaca* Kützing ex

Trevisan, Sagg. Monogr. Alg. Coccot., p. 38. 1848. —Type from Germany: Jever, Koch (L) = FLAGELLATES... FIG. 314.

MICROHALOA Kützing, Phyc. Gener., p. 169. 1843. —Type species: *M. botryoides* Kützing, loc. cit. 1843. *Micraloa botryoides* Kützing ex Trevisan, Sagg. Monogr. Alg. Coccot., 38. 1848. *Cystococcus botryoides* Rabenhorst, Krypt.-Fl. Sachsen 1: 137. 1863. *Chlorococcum botryoides* Rabenhorst, Fl. Eur. Algar. 3: 57. 1868. —Type from Germany: Nordhausen, Kützing (L) = PHYTOCONIS BOTRYOIDES (L.) Bory. FIG. 313.

Microbaloa major Kützing in Desmazières, Pl. Crypt. Fr. 11: 534. 1858. —Type: Algier?, ex herb. Montagne (L) = encysted FLAGELLATES. FIG. 312.

Microbaloa pallida Kützing, Tab. Phyc. 1: 5. 1846. *Micraloa pallida* Kützing ex Trevisan, Sagg. Monogr. Alg. Coccot., p. 37. 1848. —Type from France: Arromanches, herb. Lenormand (L) = EUDORINA ELEGANS Ehrenb. FIG. 315.

MONTANOA Gonzalez Guerrero, Anal. Jard. Bot. Madrid 8: 267. 1948. —Type species: *M. castellana* Gonzalez Guerrero, ibid. 8: 268. 1948. —The original description is here designated as the temporary Type = CALOTHRUX sp.

Myxobactron birundiforme G. S. West, Ann. So. Afr. Mus. 9: 63. 1911. *Dactylococcopsis birundiformis* Geitler, Rabenh. Krypt.-Fl. 14: 284. 1932. —Type from Angola: Mossamedes, Pearson (in the slide collection, BIRM) = ANKISTRODESMUS FALCATUS (Corda) Ralfs.

Myxobactron palatinum Schmidle, Allgem. Bot. Zeitschr. 1905: 65. 1906. *Dactylococcopsis rhabdidioides* f. *longior* Geitler, Rabenh. Krypt.-Fl. 14: 282. 1932. —The original description is here designated as the temporary Type = DIATOMS.

MYXOBACTRON Schmidle, Hedwigia 43: 415. 1904. —Type species: *M. Usterianum* Schmidle, loc. cit. 1904. —Type from Negros island, Philippines: Urwald bei S. Carlos, A. Usteri 18 (ZT) = DIATOMS.

Myxosarcina burmensis Skuja, Nova Acta R. Soc. Sci. Uppsal., ser. 4, 14(5): 21. 1949. —Type from Rangoon, Burma, L. P. Khanna 529 (in the collection of L. P. Khanna) = BACTERIA.

CHROOCOCCACEAE Subfam. EUCHROOCOCCACEAE Hansgirg, Prodr. Algenfl. Böhmen 2: 129. 1892. CHROOCOCCACEAE Subfam. EUCHROOCOCCACEAE Gruppe THECINEAE Hansgirg, loc. cit. 1892. —Type genus: ONCOBYRSA Agardh, Flora 10(2): 629. 1827. —Type species: *O. fluviatilis* Agardh, loc. cit., 1827. *Cagniardia fluviatilis* Trevisan, Sagg. Monogr. Alg. Coccot., p. 51. 1848. —Type from Bohemia: Carlsbad, C. A. Agardh (LD) = FUNGI with spores. FIG. 348, 360.

PSEUDONCOBYRSA Geitler, Beih. z. Bot. Centralbl., II, 41: 237. 1925; in Pascher, Süßwasserfl. 12: 121. 1925. —Type species: *Oncobyrsa lacustris* Schröter & Kirchner, Veget. des Bodensees, p. 102. 1896. *Pseudoncobyrsa lacustris* Geitler, Beih. z. Bot. Centralbl., II, 41: 237. 1925; in Pascher, Süßwasserfl. 12: 121. 1925. —The original description is here designated as the temporary Type = ASTEROCYTIS ORNATA (Ag.) Hamel.

Oncobyrsa sparsa Rabenhorst, Fl. Eur. Algar. 2: 69. 1865. *Coccochloris sparsa* Brébisson pro synonym. in Rabenhorst, loc. cit. 1865. —The original description is here designated as the temporary Type = palmelloid STICHOCOCCUS SUBTILIS (Kütz.) Kierck.

ONKONEMA Geitler, Arch. f. Hydrobiol., Suppl. 12, 4: 627. 1933. —Type species: *O. compactum* Geitler, loc. cit. 1933. —Type from southern Sumatra: Ranau-See, 5 Feb. 1929 (slide no. RW2a in the collection of L. Geitler) = primordia of HAPALOSIPHON LAMINOSUS (Kütz.) Hansg.

Oscillatoria clavata Corda, Almanach de Carlsbad (C. J. de Carro, ed.) 6: 203. 1836. —The original description is here designated as the temporary Type = CLADOTHRUX sp.

Oscillatoria limnetica var. *acicularis* f. *brevis* Nygaard, K. Danske Vidensk. Selsk. Biol. Skr. 7(1): 191. 1949. *Dactylococcopsis inaequalis* Nygaard pro synonym., ibid., p. 192. 1949. —Type from Denmark: Molledammen i Sønderborg, 26 Aug. 1944 (in the collection of G. Nygaard) = BACTERIA.

PAGEROGALA Wood, Smiths, Contrib. Knowl. 241: 81. 1872. —Type species: *P. stellio* Wood, ibid. p. 82. 1872. —The original description is here designated as the temporary Type = ANIMAL MATERIAL.

TRYPOTHALLUS Hooker f. & Harvey in Hooker, Bot. Antarct. Voy. Erebus & Terror 1839—43, 1(2): 500. 1847. —Type species: *Palmella anastomosans* Hooker f. & Harvey, London Journ. Bot. 4: 298. 1845. *Trypsothallus anastomosans* Hooker f. & Harvey, Bot. Antarct. Voy. Erebus & Terror 1839—43, 1(2): 500. 1847. *Palmodictyon Hookeri* Kützing, Sp. Algar., p. 234. 1849. *Gloiodictyon anastomosans* de Toni, Syll. Algar. 2: 653. 1889. —Type from Kerguelen island: moist caves near the sea, Christmas Harbour, no. 700, May 1840 (K) = primordia of PRASIOLA sp.

Palmella aurantia Agardh, Syst. Algar., p. 14. 1824. *Coccochloris aurantia* Wallroth, Fl. Crypt. Germ. 2: 6. 1833. *Cagniardia aurantia* Trevisan, Sagg. Monogr. Alg. Coccot., p. 49. 1848. *Aphanocapsa aurantia* Rabenhorst, Fl. Eur. Algar. 2: 51. 1865. *Chroococcus aurantiacus* Wille, Nyt Mag. Naturvid. 56(1): 50. 1918. *Schizochlamys aurantia* Drouet & Daily, Lloydia 11: 79. 1948. —Type from Sweden: Traneberg, 30 Jul. 1823, herb. Agardh (LD) = SCHIZOCHLAMYS AURANTIA (Ag.) Dr. & Daily. FIG. 361.

Palmella cylindrica Lyngbye, Tent. Hydrophyt. Dan., p. 205. 1819. *Coccochloris cylindrica* Brébisson in Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5(Sci. Fis. & Mat.): 46, 68. 1843.

—The original description is here designated as the temporary Type = CHLOROPHYCEAE.

CYLINDROCYSTIS Meneghini, Cenni sulla Organogr. & Fisiol. d. Alg., p. 5, 26. 1838. —Type species: *Palmella cylindrospora* Brébisson in Brébisson & Godey, Mém. Soc. Acad. Sci., Art. & Belles-Lettres Falaise 1835: 256. 1836. *Cylindrocystis Brébissonii* Meneghini, Cenni sulla Organogr. & Fisiol. d. Alg., p. 5. 1838; in Desmazières, Pl. Crypt. Fr., ed. 2, no. 914. 1838. *Palmogloea Brébissonii* Kützing, Tab. Phyc. 1: 19. 1846. *P. Meneghinii* Kützing loc. cit. 1846. *Penium Brébissonii* Ralfs, Brit. Desmid., p. 153. 1848. *Cylindrocystis cylindrospora* Drouet & Daily, Leaflet. Acadian Biol. 1: 16. 1953. —Type from France: Falaise, ex herb. Lenormand (FI) = CYLINDROCYSTIS CYLINDROSPORA (Bréb.) Dr. & Daily.

Palmella depressa Berkeley, Glean. Brit. Alg., p. 19. 1833. *Coccochloris depressa* Menegh., Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 46, 68. 1843. *Aphanocapsa depressa* Rabenhorst, Fl. Eur. Algar. 2: 51. 1865. —Type from England: "Palmella depressa", herb. Berkeley (K) = palmelloid plants of STIGEOCLONIUM sp.

Palmella effusa Kützing, Linnaea 8: 375. 1833. —Type from Germany: im Bruchteiche prope Tennstaedt, with *Oscillatoria alba*, F. T. Kützing (FC) = BACTERIA.

Palmella flava Kützing, Tab. Phyc. 1: 9. 1846. *Cagniardia flava* Trevisan, Sagg. Monogr. Alg. Coccot., p. 49. 1848. *Aphanocapsa flava* Rabenhorst, Fl. Eur. Algar. 2: 50. 1865. —Type from France: Vire, herb. Lenormand (L) = EUDORINA ELEGANS Ehrenb. FIG. 349.

Palmella fusiformis Roemer, Alg. Deutschl., p. 64. 1845. *P. fusiformis* Rabenhorst, Deutschl. Krypt.-Fl. 2: 60. 1847. *Cagniardia fusiformis* Trevisan, Sagg. Monogr. Alg. Coccot., p. 50. 1848. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Palmella gigantea Sommerfelt, Suppl. Fl. Lapon., p. 203. 1826. —Type from Norway: *Palmella gigantea*. E. Norveg. Sommerf. (C) = ZOOCHLORELLA PARASITICA Brandt in OPHRYDIUM sp.

Palmella globosa Agardh, Syst. Algar., p. 13. 1824. *Coccochloris globosa* Crouan fr., Fl. Finistère, p. 110. 1867. —Type from Sweden: "Palmella globosa" (LD) = ZOOCHLORELLA PARASITICA Brandt in OPHRYDIUM sp.

Palmella heterospora Rabenhorst, Krypt.-Fl. Sachsen 1: 129. 1863. —Isotypes from Germany in Rabenh. Alg. Sachs. 970 (FC, FI, L, TA) = STICHOCOCCUS BACILLARIS Näg.

Palmella hormospora Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 52. 1843. *Phytocosis hormospora* Trevisan, Prosp. Fl. Eugani., p. 57. 1843. *Cagniardia hormospora* Trevisan, Sagg. Monogr. Alg. Coccot., p. 48. 1848. —Type from Italy: "Palmella hormospora" (FI) = NOSTOC HUMIFUSUM Carm. FIG. 356.

HOMALOCOCCUS Kützing, Oster-Progr. Realsch. Nordhausen, p. 6. 1863; Hedwigia 2: 86. 1863. —Type species: *Palmella hyalina* Lyngbye, Tent. Hydrophyt. Dan., p. 204. 1819. *Coccochloris hyalina* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 46, 66. 1843. *Cagniardia Kuetsingiana* Trevisan, Sagg. Monogr. Alg. Coccot., p. 50. 1848. *Chaos hyalinus* Bory ex Trevisan, ibid., p. 56. 1848. *Homalococcus Hassallii* Kützing, Oster-Progr. Realsch. Nordhausen, p. 6. 1863; Hedwigia 2: 86. 1863. *Aphanothece hyalina* A. Braun ex Hansgirg, Prodr. Algenfl. Böhmen 2: 159. 1892. —Type from Faeroes islands: in fossis rivuli ad Thorshavn, 26 Jun. 1817 (C) = TETRASPORA GELATINOSA (Vauch.) Desv.

Palmella miniata Leiblein, Flora 13(1): 338. 1830. *Merrettia miniata* Trevisan, Sagg. Monogr. Alg. Coccot., p. 46. 1848. *Protococcus viridis* var. *miniatus* Wolle, Fresh-w. Alg. U. S., p. 181. 1887. —Type from Germany: aus einem Sümpfe, Würzburg, Leiblein, 12 Mar. 1827 (L) = encysted FLAGELLATES.

PALMELLA Untergattung TETRATOCE Nägeli, Die Neuern Algensyst., p. 131. 1847. —Type species: *Palmella aequalis* Nägeli in Kützing, Sp. Algar., p. 212. 1849. *P. miniata* var. *aequalis* Nägeli, Gatt. Einzell. Alg., p. 67. 1849. *Palmella miniata* b. *aequalis* Nägeli ex Rabenhorst, Fl. Eur. Algar. 3: 34. 1868. *Aphanocapsa aequalis* Hansgirg, Prodr. Algenfl. Böhmen 2: 158. 1892. —Type from Switzerland: feuchte Felsen, Zürich, Nägeli 307 (L) = CHLOROPHYCEAE (TETRASPORA sp?).

Palmella minuta Agardh, Flora 10(2): 630. 1827. *Coccochloris minuta* Wallroth, Fl. Crypt. Germ. 2: 5. 1833. *Anacystis minuta* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 47, 94. 1843. *Cagniardia minuta* Trevisan, Sagg. Monogr. Alg. Coccot., p. 50. 1848. *Aphanothece minuta* Migula, Krypt.-Fl. Deutschl., II, Alg. la: 35. 1905. —Type from Bohemia: Carlsbad, herb. Agardh (LD) = STICHOCOCCUS SUBTILIS (Kütz.) Klerck.

Palmella mirifica Rabenhorst, Algen Sachs. 55—56: 541. 1856. —Type from Germany: Dresden, H. Richter, 1856 (Rabenh. Alg. Sachs. 541, L) = BACTERIA.

PALMELLA Untergattung DITOCE Nägeli, Die Neuern Algensyst., p. 131. 1847. —Type species: *Palmella mucosa* Kützing, Phyc. Gener., p. 172. 1843. *Merrettia mucosa* Trevisan, Sagg. Monogr. Alg. Coccot., p. 46. 1848. —Type from Germany: in saxis rivulorum (Zorge), Nordhausen, Kützing, 1 Mar. 1841 (L) = young TETRASPORA GELATINOSA (Vauch.) Desv.

Palmella parvula Kützing, Phyc. Gener., p. 171. 1843. *Cagniardia parvula* Trevisan, Sagg. Monogr. Alg. Coccot., p. 50. 1848. —Type from Germany: Nordhausen, Kützing (L) = PALMO-DICTYON VIRIDE Kütz. FIG. 362.

Palmella pelluissima Bory in Mougeot & Roumeguère in Louis, Départ. des Vosges, Alg., p. 35 (of reprint). 1887. —Type from France: in lignis aqua immersis rivulorum circa Retournemer, Vosges, May 1822 (L) = FLAGELLATA.

Palmella pila Suhr, Flora 23(1): 297. 1840. *Coccchloris pila* Kützing, Phyc. Germ., p. 150. 1845. —Type from Germany: an der Eider, Suhr (L) = ZOOCHLORELLA PARASITICA Brandt in OPHRYDIUM sp.

Palmella rubescens Brébisson in Brébisson & Godey, Mém. Soc. Acad. Sci., Art. & Belles-Lettres 1835: 256. 1836. *Microcystis rubescens* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 47, 86. 1843. *Coccchloris rubescens* Brébisson pro synon. in Meneghini, loc. cit. 1843. *Bichatia rubescens* Trevisan, Nomencl. Algar. 1: 62. 1845. *Palmogloea rubescens* Kützing, Tab. Phyc. 1: 19. 1846. *Cagniardia Brébissonii* Trevisan, Sagg. Monogr. Alg. Coccot., p. 49. 1848. *Mesotaenium rubescens* Drouet & Daily in Drouet, Proc. Minnesota Acad. Sci. 22: 136. 1956. —Type from France: Falaise, A. de Brébisson (L) = MESOTAENIUM RUBESCENS (Bréb.) Dr. & Daily.

Palmella terminalis Agardh, Icon. Algar. Eur. 14. 1828—35. *Coccchloris terminalis* Brébisson in Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 46, 67. 1843. *C. sbernalis* Rabenhorst, Deutschl. Krypt.-Fl. 2(2): 60. 1847. —Type labeled "Sept. 1825" in herb. Agardh (LD) = TETRASPORA GELATINOSA (Vauch.) Desv.

Palmella uvaeformis Kützing, Alg. Aq. Dulc. Dec. 11: 102. 1834. *Cagniardia uvaeformis* Trevisan, Sagg. Monogr. Alg. Coccot., p. 50. 1848. *Palmella partibilis* Suhr pro synon. ex Kützing, Sp. Algar., p. 211. 1849. —Type from Germany: Eilenburg (L) = primordia of CHLOROPHYCEAE.

Palmogloea aureo-nucleata Brébisson in Rabenhorst, Alg. Eur. 218—220: 2190. 1870. —Type from France: in paludibus turfosis, Falaise, Brébisson (in Rabenh. Alg. 2190, L) = ASTEROCYTIS ORNATA (Ag.) Hamel.

Palmogloea crassa Kützing, Tab. Phyc. 1: 19. 1846. —Type from Germany: Oberharz, herb. Kützing (L) = MESOTAENIUM RUBESCENS (Bréb.) Dr. & Daily.

Palmogloea dimorpha Kützing, Sp. Algar., p. 229. 1849. *Coccchloris macrocarpa* Brébisson pro synon. in Kützing, loc. cit. 1849. —Type from France: mousses humides, Falaise (L) = MESOTAENIUM RUBESCENS (Bréb.) Dr. & Daily.

TRICHO CYSTIS Kützing, Tab. Phyc. 1: 20. 1846. —Type species: *Palmogloea gigantea* Kützing, Bot. Zeitung 5: 221. 1847. *Trichocystis gigantea* Kützing, Tab. Phyc. 1: 20. 1846. —Type from Germany: Tolkwade bei Schleswig, Suhr, Apr. 1840 (L) = ZOOCHLORELLA PARASITICA Brandt in OPHRYDIUM sp. FIG. 364.

Palmogloea lurida Flotow in Kützing, Tab. Phyc. 1: 20. 1846. —Type from Sudetenland, Bohemia: unweit der Gibraltar-felsen, Flotow, 8 Jun. 1844 (L) = MESOTAENIUM RUBESCENS (Bréb.) Dr. & Daily.

Palmogloea macrococca Kützing, Phyc. Germ., p. 153. 1845. *Mesotaenium Braunii* de Bary, Unters. Fam. Conjugat., p. 74. 1858. *M. macrococcum* Kützing ex Roy (& Bisset), Ann. Scott. Nat. Hist. 1894: 253. 1894. —Type from Germany: Oberharz, herb. Kützing (L) = MESOTAENIUM RUBESCENS (Bréb.) Dr. & Daily.

Palmogloea micrococca Kützing, Tab. Phyc. 1: 20. 1846. *Mesotaenium macrococcum* var. *micrococcum* Kirchner ex W. & G. S. West, Trans. Yorkshire Nat. Union 5: 41. 1900. —Type from France: Vire, Lenormand (L) = palmelloid BOTRYDIUM GRANULATUM (L.) Grev.

Palmogloea rupestris Kützing, Phyc. Germ., p. 153. 1845. *Polycoccus marginatus* Kützing in Roemer, Alg. Deutschl., p. 65. 1845. —Type from Germany: Römer 105 (L) = MESOTAENIUM RUBESCENS (Bréb.) Dr. & Daily.

PARACAPSA Naumann, Ark. f. Bot. 18(21): 6. 1924. —Type species: *P. siderophila* Naumann, loc. cit. 1924. *Pseudoncobyrza siderophila* Geitler, Beih. z. Bot. Centralbl., II, 41: 237. 1925; in Pascher, Süßwasserfl. 12: 122. 1925. —Topotype, here designated as the Type, from Sweden: Förthultsjön, Aneboda, G. Israelson, 2 Jul. 1928 (S) = CAPSOSIRA BREBISSEONII Kütz.

PAULINELLA Lauterborn, Zeitschr. f. Wiss. Zool. 59: 537, 543. 1895. —Type species: *P. chromatophora* Lauterborn, loc. cit. 1895. —The original description is here designated as the temporary Type = RHIZOPODA.

PELIAINA Pascher, Jahrb. f. Wiss. Bot. 71(3): 458. 1929. —Type species: *P. cyanea* Pascher, ibid., p. 459. 1929. —The original description is here designated as the temporary Type = FLAGELLATES.

PILGERIA Schmidle, Hedwigia 40: 53. 1901. —Type species: *P. brasiliensis* Schmidle, ibid., p. 54. 1901. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Placoma corticalis Shousboe ex Bornet, Mém. Soc. Nat. Sci. Nat. & Math. Cherbourg 28: 241. 1892. —Published as a synonym of RALFSIA VERRUCOSA Aresch.

Placoma fusca Schousboe ex Bornet, Mém. Soc. Nat. Sci. Nat. & Math. Cherbourg 28: 241. 1892. —Published as a synonym of RALFSIA VERRUCOSA Aresch.

Placoma lapidea Schousboe ex Bornet, Mém. Soc. Nat. Sci. Nat. & Math. Cherbourg 28: 347. 1892. —Published as a synonym of HILDBRANDTIA PROTOTYPUS Nardo.

Placoma membranacea Schousboe ex Bornet, Mém. Soc. Nat. Sci. Nat. & Math. Cherbourg 28: 231. 1892. —Published as a synonym of ZANARDINIA COLLARIS (Ag.) Crouan fr.

Pleurocapsa parenchymatica Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 626. 1933. *Scopulonema parenchymaticum* Geitler in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, 1b: 93. 1942. —Type from central Java: Seraja unterhalb Patagbanteng, *Rutner*, 5 Jun. 1929 (slide no. D6aα in the collection of L. Geitler) = young LICHEN.

Pleurocapsa Usteriana Schmidle, Hedwigia 43: 414. 1904. —Type from Java: in einem kleinen Wasserfall, Dioputal, *A. Usteri* 43, 9 May 1903 (ZT) = young TETRASPORACEAE.

Pleurococcus angulosus var. *irregularis* Hansgirg, Prodr. Algenfl. Böhmen 1(2): 237. 1888. —Type from Bohemia: Plana nächst Tabor, *A. Hansgirg*, 4 May 1886 (W) = FLAGELLATES.

Pleurococcus angulosus f. *tectorum* Trevisan ex Kirchner, Krypt.-Fl. Schlesien 2(1): 115. 1878. —The original description is here designated as the temporary Type = STICHOCOCCUS SUBTILIS (Kütz.) Klerck.

Pleurococcus antarcticus W. & G. S. West, Brit. Antarct. Exped., 1907—09, 1: 276. 1911. *P. antarcticus* f. *simplex* Fritsch, Nat. Antarct. Exped. (1901—04), Nat. Hist. 6(Freshw. Alg.): 14. 1912. *Protococcus antarcticus* G. S. West, Journ. of Bot. 54: 2. 1916. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Pleurococcus antarcticus f. *filamentosus* Fritsch, Nat. Antarct. Exped. (1901—04), Nat. Hist. 6(Freshw. Alg.): 14. 1912. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Pleurococcus antarcticus f. *minor* Fritsch, Nat. Antarct. Exped. (1901—04), Nat. Hist. 6(Freshw. Alg.): 14. 1912. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Pleurococcus antarcticus f. *robustus* W. & G. S. West, Brit. Antarct. Exped., 1907—09, 1: 276. 1911. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Pleurococcus antarcticus f. *stellatus* Fritsch, Nat. Antarct. Exped. (1901—04), Nat. Hist. 6(Freshw. Alg.): 14. 1912. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Pleurococcus antarcticus f. *typicus* Fritsch, Nat. Antarct. Exped. (1901—04), Nat. Hist. 6(Freshw. Alg.): 13. 1912. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Pleurococcus aquaticus Snow, Bull. U. S. Fish Comm. 1902: 383. 1903. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Pleurococcus Beigelii Kuchenmeister & Rabenhorst, Hedwigia, 1867: 49. 1867. *Hyalococcus Beigelii* Schröter, Pilze Schlesiens 1: 152. 1886. —Type from England: an Chignon-Haaren, London, Dr. Beigel (in Rabenh. Alg. Eur. 2053, NY) = BACTERIA.

CYANODERMA Weber-van Bosse, Natuurk. Verh. Holl. Maatsch. Wetensch. Haarlem, ser. 3, 5: 18. 1887. CYANODERMA Subgenus EUCYANODERMA Hansgirg, Notarisia 3: 588. 1888. —Type species: *Pleurococcus Bradypis* Kuhn in Welcker, Abh. Naturf. Ges. Halle 9: 66. 1866. *Cyanoderma Bradypodis* Weber-van Bosse, Natuurk. Verh. Holl. Maatsch. Wetensch. Haarlem, ser. 3, 5: 18. 1887. *Pleurocapsa Bradypodis* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 92. 1890. —The original description is here designated as the temporary Type = RHODOPHYCEAE.

Pleurococcus calcarinus Boye Petersen, K. Dansk. Vidensk. Selsk. Skr., 7(Naturv.-Math. Afd.), 12: 320. 1916. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Pleurococcus Chloepii Kuhn in Welcker, Abh. Naturf. Ges. Halle 9: 66. 1866. *Cyanoderma Chloepodis* Weber-van Bosse, Natuurk. Verh. Holl. Maatsch. Wetensch. Haarlem, ser. 3, 5: 18. 1887. *Pleurocapsa Chloepodis* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1890(2): 91. 1890. —The original description is here designated as the temporary Type = RHODOPHYCEAE.

Pleurococcus cinnamomeus Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5(Sci. Fis. & Mat.): 42. 1843. *Protococcus cinnamomeus* Kützing, Tab. Phyc. 1: 5. 1846. *Cbroococcus cinnamomeus* Rabenhorst, Krypt.-Fl. Sachsen 1: 70. 1863. —Type from Italy: in olis seminarii (Padova), Jul. 1839, herb. Meneghini (FI) = PROTOSIPHON CINNAMOMEUS (Menegh.) Dr. & Daily, COMB. NOV.

Pleurococcus conglomeratus Artari, Bull. Soc. Imp. Nat. Moscou, N. S., 6: 244. 1893. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Pleurococcus crenulatus Hansgirg, Oesterr. Bot. Zeitschr. 36: 110. 1886. —Type from Bohemia: Veseli, *A. Hansgirg*, Aug. 1884(W) = STICHOCOCCUS SUBTILIS (Kütz.) Klerck. FIG. 335.

Pleurococcus ellipticus Meneghini, Consp. Algol. Eugean., p. 338. 1837. *Protococcus ellipticus* Kützing, Sp. Algar., p. 198. 1849. —Type from the Euganean springs, Italy: "Pleurococcus ellipticus", Meneghini (FI) = CYLINDROSPERMUM MUSCICOLA Kütz., spores.

Pleurococcus frigidus W. & G. S. West, Brit. Antarct. Exped., 1907—09, 1: 276. 1911. *Protococcus frigidus* G. S. West, Journ. of Bot. 54: 2. 1916. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Pleurococcus Koeltzii Fritsch, Nat. Antarct. Exped. (1901—04), Nat. Hist. 6(Freshw. Alg.):

15. 1912. *Chlorella Koeltzii* Wille, Deutsche Südpolar-Exp., 1901—03, 8: 401. 1928. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Pleurococcus marinus* Collins, Rhodora 9: 197. 1907. —Type from Maine: in a marsh pool, Stovers point, Harpswell, F. S. Collins, 16 Jul. 1906 (in Coll., Hold. & Setch., Phyc. Bor.-Amer. 1316, NY) = CHLOROPHYCEAE.
- Pleurococcus marinus* Hansgirg in Foslie, Mar. Alg. Norway 1: 158. 1890. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Pleurococcus marinus* f. *major* Hansgirg in Foslie, Mar. Alg. Norway 1: 158. 1890. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Pleurococcus miniatus* var. *fuscescens* Hansgirg, Physiol. & Algol. Stud., p. 87. 1887. —Type from Bohemia: Horrus Kinsky, Smichov, A. Hansgirg, Oct. 1883 (W) = FLAGELLATES. FIG. 336.
- Pleurococcus miniatus* var. *roseolus* Hansgirg, Prodr. Algenfl. Böhmen 1(2): 134. 1888. —Type from Bohemia: Libsic, A. Hansgirg, Aug. 1886 (W) = FLAGELLATES. FIG. 337.
- Pleurococcus monetarum* Reinsch, Flora 67: 176. 1884. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Pleurococcus nimbalus* de Wildeman, Notarisia 1893: 7. 1893. *Tetracoccus Wildemanii* Schmidle, Flora 78: 45. 1894. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Pleurococcus pachydermus* Lagerheim in Wittrock & Nordstedt, Alg. Exs. 9: 447. 1882. *Protococcus pachydermus* G. S. West, Journ. of Bot. 54: 2. 1916. —Type from Sweden: ad Bellevue prope Holmiam, G. Lagerheim, Jun. 1881 (in Wittrock & Nordstedt, Alg. Exs. 447, L) = PHYTOCONIS BOTRYOIDES (L.) Bory, parasitized in part. FIG. 338.
- Pleurococcus pachydermus* f. *stipitatus* W. & G. S. West, Brit. Antarct. Exped., 1907—09, 1: 275. 1911. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Pleurococcus pulcher* Kirchner, Jahresh. Ver. Vaterl. Naturk. Württemberg 36: 170. 1880. *Protococcus viridis* *β* *pulcher* Hansgirg in Wittrock & Nordstedt, Alg. exs. 15: 721. 1886. *P. viridis* var. *pulcher* Hansgirg, Prodr. Algenfl. Böhmen 1: 141. 1886. —The original description is here designated as the temporary Type = SCHIZOGONIUM MURALE Kütz.
- Pleurococcus regularis* Artari, Bull. Soc. Imp. Nat. Moscou, N. S., 6: 245. 1893. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Pleurococcus rufescens* var. *sanguineus* W. & G. S. West, Journ. of Bot. 36: 336. 1898. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Pleurococcus seriatus* Wood, Smiths. Contrib. Knowl. 241: 78. 1872. —The original description is here designated as the temporary Type = PROTOSIPHON CINNAMOMEUS (Menegh.) Dr. & Daily.
- Pleurococcus simplex* Artari, Bull. Soc. Imp. Nat. Moscou, N. S., 6: 243. 1893. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Pleurococcus superbus* Cienkowski, Bot. Zeitung 23: 21. 1865. —The original description is here designated as the temporary Type = encysted FLAGELLATES.
- Pleurococcus tectorum* f. *antarcticus* Wille, Deutsche Südpolar-Exp., 1901-03, 8: 398. 1928. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Pleurococcus vestitus* Reinsch, Algenfl. Mittl. Th. Franken, p. 56. 1867. *Protococcus viridis* var. *vestitus* Wolle, Fresh-w. Alg. U. S., p. 183. 1887. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Pleurococcus vestitus* f. *chlorophyllaceus* Lagerheim, Öfvers. K. Sv. Vet.-Akad. Förh. 1882(2): 79. 1882. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Pleurococcus vulgaris* f. *cobaerens* Wittrock in Lagerheim Öfvers. K. Sv. Vet.-Akad. Förh. 40(2): 59. 1883. *P. vulgaris* var. *cobaerens* Wittrock ex Hansgirg, Prodr. Algenfl. Böhmen 1: 133. 1886. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Pleurococcus vulgaris* f. *glomeratus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1891(1): 320. 1891. —Type from Dalmatia: Cannosa nächst Ragusa, A. Hansgirg, 1891 (W) = primordia of STIGEOCLONIUM sp. FIG. 339.
- Pleurococcus vulgaris* f. *minor* Rabenhorst ex Kirchner, Krypt.-Fl. Schlesien 2(1): 115. 1878. —The original description is here designated as the temporary Type = STICHOCOCCUS SUBTILIS (Kütz.) Klerck.
- Polycoccus lucidus* Roemer, Alg. Deutschl., p. 65. 1845. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- POLYCOCCUS* Kützling, Phyc. Germ., p. 148. 1845. —Type species: *Polycoccus punctiformis* Kützling, Natuurk. Verh. Holl. Maatsch. Wetensch. Haarlem, p. 67. 1841. *Microcystis punctiformis* Kirchner, Krypt.-Fl. Schlesien 2(1): 256. 1878. —Type from Germany: Nordhausen, F. T. Kützling (ZT) = NOSTOC sp., parasitized in part.
- Polycystis marginata* var. *minor* Hansgirg, Prodr. Algenfl. Böhmen 2: 145. 1892. *Microcystis marginata* var. *minor* Hansgirg ex Forti, Syll. Myxophyc., p. 91. 1907. —Type from Bohemia: Ouzic nächst Kralup, A. Hansgirg, Oct. 1883 (W) = LAMPROCYSTIS ROSEA (Kütz.) Dr. & Daily.
- Polycystis violacea* Itzingsohn in Rabenhorst, Alg. Sachs. 31 & 32: 306. 1853. *P. purpurascens* A. Braun ex Rabenhorst, Krypt.-Fl. Sachsen 1: 74. 1863. *Aphanisbece purpurascens* A. Braun pr

synon. in Rabenhorst, loc. cit. 1863. *Microhaloa jodes* Itzigsohn *pro* *synon.* in Rabenhorst, loc. cit. 1863. *Polycystis ichtyoblabe* b. *purpurascens* A. Braun ex Rabenhorst Fl. Eur. Algar. 2: 53. 1865. *Microcystis ichtyoblabe* var. *purpurascens* A. Braun ex Forti, Syll. Myxophyc., p. 89. 1907. —Type from Germany: im Rehwinkel, Itzigsohn, Aug. 1852 (in Rabenh. Algen 306, B) = BACTERIA. FIG. 352.

Porphyridium aerugineum Geitler, Oesterr. Bot. Zeitschr. 72: 84. 1923. —The original description is here designated as the temporary Type = *P. CRUENTUM* (Sm. & Sow.) Näg.

Porphyridium magnificum Wood, Proc. Amer. Philos. Soc. 11: 144. 1869. —Type from Texas (UC) = *P. CRUENTUM* (Sm. & Sow.) Näg.

RHODOPLAX Schmidle & Wellheim, Bull. Herb. Boiss., ser. 2, 1: 1012. 1901. —Type species: *Porphyridium Schinzii* Schmidle, Beih. z. Bot. Centralbl. 10: 180. 1901. *Rhodoplax Schinzii* Schmidle & Wellheim, Bull. Herb. Boiss., ser. 2, 1: 1012. 1901. —Type from the Rheinfall at Schaffhausen, Switzerland (slides in the collection of G. Schmidle, ZT) = primordia of *CHANTRANSIA* (*BATRACHOSPERMUM*?) sp.

Porphyridium sordidum Geitler, Arch. f. Protistenk. 76: 595. 1932. —The original description is here designated as the temporary Type = *P. CRUENTUM* (Sm. & Sow.) Näg.

Porphyridium Wittrockii Richter in Wittrock & Nordstedt, Alg. Exs. 9: 440. 1882. *P. cruentum* β *Wittrockii* Hansgirg, Oesterr. Bot. Zeitschr. 35: 315. 1884. *Aphanocapsa Wittrockii* Hansgirg, Bot. Centralbl. 22: 34. 1885. *A. cruenta* var. *Wittrockii* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss. Math.-Nat. Cl., 1890(2): 138. 1891. *A. cruenta* b. *Wittrockii* Hansgirg, Prodr. Algenfl. Böhmen 2: 155. 1892. —Isotype from Germany: Anger prope Lipsiam, P. Richter, 29 Nov. 1881 (in Wittrock & Nordstedt, Alg. Exs. 440 (FC) = *PORPHYRIDIDIUM CRUENTUM* (Sm. & Sow.) Näg.

Protococcus angulosus Corda in Sturm, Deutschlands Fl., II, 6: 41. 1833. *Microcystis angulosa* Kützing, Linnaea 8: 374. 1833. *Pleurococcus angulosus* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 10, 37. 1843. *P. Meneghini* Brébisson *pro* *synon.* in Meneghini, loc. cit. 1843. *P. angulosus* f. *palustris* Kützing ex Kirchner, Krypt.-Fl. Schlesien 2(1): 115. 1878. *Protococcus viridis* var. *angulosus* Wolle, Fresh-w. Alg. U. S., p. 181. 1887. *Pleurococcus angulosus* a. *palustris* Kirchner ex Hansgirg, Prodr. Algenfl. Böhmen 1: 134. 1886. —The original description is here designated as the temporary Type = *CHLOROPHYCEAE*.

Protococcus annulatus Pascher, Süßwasserrfl. 5 (Chlorophyc. 2): 226. 1915. —The original description is here designated as the temporary Type = *CHLOROPHYCEAE*.

Protococcus atlanticus Montagne, Ann. Sci. Nat. III. Bot. 6: 267. 1846. *Sphaerella atlantica* Lemmermann, Abh. Nat. Ver. Bremen 17: 345. 1903. —Type from the Atlantic ocean, off Portugal: inter promontoria Spichel et la Rocca, Turrell & de Freycinet (PC) = *FLAGELLATES*.

Protococcus aurantio-fuscus Kützing, Phyc. Germ., p. 146. 1845. *Chroococcus aurantio-fuscus* Rabenhorst, Fl. Eur. Algar. 2: 34. 1865. —Type from Bohemia: ad parietes in caldariis horti Pragenses, ex herb. Meneghini (L) = encysted *FLAGELLATES*.

Protococcus aureo-viridis Kützing, Phyc. Germ., p. 146. 1845. *Chroococcus aureo-viridis* Rabenhorst, Krypt.-Fl. Sachsen 1: 70. 1863. *Pleurococcus aureo-viridis* Rabenhorst, Fl. Eur. Algar. 3: 26. 1868. —Type from Germany: Nordhausen, herb. Kützing (L) = primordia of *CHLOROPHYCEAE*.

Protococcus aureus Kützing, Tab. Phyc. 1: 3. 1846. *Protosphaeria aurea* Trevisan, Sagg. Monogr. Alg. Coccot., p. 29. 1848. *Chroococcus aureus* Rabenhorst, Krypt.-Fl. Sachsen 1: 70. 1863. *C. macrococcus* f. *aureus* Rabenhorst, Fl. Eur. Algar. 2: 33. 1865. *C. macrococcus* var. *aureus* Rabenhorst ex Hansgirg, Prodr. Algenfl. Böhmen 2: 160. 1892. —Type from Bohemia: Hirschberg, v. Flotow 3, 1841 (L) = *FLAGELLATES*.

STICHOCOCCUS Nägeli, Gatt. Einzell. Alg., p. 76. 1849. —Type species: *Protococcus bacillaris* Nägeli in Kützing, Sp. Algar., p. 198. 1849. *Stichococcus bacillaris* Nägeli, Gatt. Einzell. Alg., p. 77. 1849. *Ulothrix bacillaris* Forest, Handb. Alg., p. 72. 1954. —The original description is here designated as the temporary Type = *STICHOCOCCUS BACILLARIS* Näg.

PROTOSIPHON Klebs, Beding. d. Fortpfl. b. Einig. Alg. & Pilz., p. 221. 1896. —Type species: *Protococcus botryoides* Kützing, Tab. Phyc. 1: 2. 1846. *Protosiphon botryoides* Klebs, Beding. d. Fortpfl. b. Einig. Alg. & Pilz., p. 222. 1896. —Type from Germany: Nordhausen, F. T. Kützing (L) = *P. CINNAMOMEUS* (Menegh.) Dr. & Daily.

GYANIDIUM Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 624. 1933. *PLUTO* Copeland ex Drouet, Amer. Midl. Nat. 30: 672. 1943. —Type species: *Protococcus botryoides* f. *caldarius* Tilden, Bot. Gaz. 25: 94. 1898. *Pleurocapsa caldaria* Setchell in Collins, Holden & Setchell, Phyc. Bor.-Amer. 18: 851. 1901. *Chroococcopsis caldaria* Geitler, Beih. z. Bot. Centralbl., II, 41: 241. 1925. *Cyanidium caldarium* Geitler, Arch. f. Hydrobiol., Suppl. XII, 4: 624. 1933. *Pluto caldarius* Copeland ex Drouet, Amer. Midl. Nat. 30: 672. 1943. *Dermocarpa caldaria* Drouet, loc. cit. 1943. *Chlorella caldaria* M. B. Allen, Rapp. & Comm. VIII. Congr. Int. Bot. Paris 17: 42. 1954. —Type from Yellowstone national park, Wyoming: Frying Pan basin, J. E. Tilden, Jul. 1896 (in Tild., Amer. Alg. 283, MIN) = *CHLORELLA* sp. The alga collected by Miss Tilden is definitely a green alga, its starch staining blue with iodine. The alga described by Setchell, Geitler, Copeland, Allen, and Drouet appears to be another species of *Chlorella* with blue-green pigment (see Allen, loc. cit.).

- Protococcus botryoides* var. *nidulans* Hansgirg, Prodr. Algenfl. Böhmen 1(2): 274. 1888. —Type from Bohemia: Nepomuk, A. Hansgirg, Aug. 1887 (W) = FLAGELLATES. FIG. 331.
- Protococcus brunneus* Kützing, Phyc. Germ., p. 146. 1845. *P. brunneus* Kützing in Roemer, Alg. Deutschl., p. 67. 1845. *Chroococcus brunneus* Rabenhorst, Fl. Eur. Algar. 2: 34. 1865. —Type from Germany: auf einer Lache am Hundsberge (Hartz), Römer (L) = TRACHELOMONAS sp. FIG. 323.
- Protococcus caldarii* Magnus ex Braun, Sitzungsber. Ges. Naturf. Fr. Berlin 1875: 99. 1875; ibid. 1877: 249. 1877. —Type from Germany in Rabenh. Alg. Eur. 2465 (L) = primordia (perhaps parasitized?) of TRENTEPOHLIA sp. FIG. 325.
- Protococcus Chlamidomonas* Kützing, Phyc. Gener., p. 167. 1843. *Protosphaeria Chlamidomonas* Trevisan, Sagg. Monogr. Alg. Coccot., p. 30. 1848. —Type from Germany: Nordhausen, Kützing, 12 Sept. 1842 (L) = FLAGELLATA (CHLAMYDOMONAS sp.?). FIG. 327.
- Protococcus chnaumaticus* Kützing in Roemer, Alg. Deutschl., p. 67. 1845. *Chroococcus chnaumaticus* Rabenhorst, Fl. Eur. Algar. 2: 34. 1865. —Type from Germany: auf Quarzfels des Bruchberges (Harz), Römer 149, 9 Sept. 1844 (L) = CHLOROPHYCEAE (lichen gonidia). FIG. 330.
- Protococcus Clementii* Meneghini in Kützing, Tab. Phyc. 1: 3. 1846. *Protosphaeria Clementii* Trevisan, Sagg. Monogr. Alg. Coccot., p. 29. 1848. *Haematococcus Clementii* Meneghini pro synon. ex Trevisan, loc. cit. 1848. *Gloeocystis Clementii* Rabenhorst, Fl. Eur. Algar. 3: 31. 1868. —Type from the Italian Tyrol: Campagna d'Aris, Meneghini (L) = FLAGELLATA.
- Protococcus coccoma* Kützing, Phyc. Gener., p. 168. 1843. *Palmella coccoma* Kunze pro synon. in Kützing, loc. cit. 1843. *Protococcus aurantiacus* Wallroth pro synon. in Kützing, loc. cit. 1843. *Protosphaeria coccoma* Trevisan, Sagg. Monogr. Alg. Coccot., p. 29. 1848. *Chlorococcum coccoma* Rabenhorst, Fl. Eur. Algar. 3: 59. 1868. *Haematococcus coccoma* Meneghini pro synon. ex Rabenhorst, loc. cit. 1868. —Type from Germany: Leipzig, Kunze (L) = primordia of CHLOROPHYCEAE.
- Protococcus crassus* Kützing, Tab. Phyc. 1: 4. 1846. *Chlorococcum crassum* Meneghini pro synon. in Kützing, loc. cit. 1846. *Chroococcus crassus* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. —Type from Italy: Verona, Meneghini (L) = FLAGELLATES. FIG. 334.
- Protococcus crustaceus* Kützing, Phyc. Germ., p. 146. 1845. —Type from Germany: ad corticem arborum, Nordhausen, herb. Kützing (L) = TRENTEPOHLIA sp., parasitized.
- Protococcus dissectus* var. *cuneatus* Suringar, Obs. Phycol., p. 56. 1855. —Type from the Netherlands: Boomstammen, Gagewater bij Leiden, W. F. R. Suringar DDD58, May 1854 (L) = CHLOROPHYCEAE.
- Protococcus Felisii* Meneghini in Kützing, Tab. Phyc. 1: 4. 1846. —Type from Italy: Ferrara, Meneghini (L) = CHLAMYDOMONAS sp. FIG. 332.
- Protococcus fuscatus* G. S. West, Mém. Soc. Neuchatel. Sci. Nat. 5: 1023. 1914. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Protococcus gigas* Kützing, Phyc. Germ., p. 145. 1845. *Pleurococcus gigas* Trevisan, Sagg. Monogr. Alg. Coccot., p. 34. 1848. *Chlorococcum gigas* Grunow in Rabenhorst, Alg. Eur. 143—144: 1436. 1863. *Gloeocystis gigas* Lagerheim, Öfers. K. Sv. Vet.-Akad. Förh. 40(2): 63. 1883. *Protococcus viridis* var. *gigas* Wolle, Fresh-w. Alg. U. S., p. 183. 1887. —Type from Italy: Battaglia, Meneghini (L) = encysted FLAGELLATES.
- Protococcus globosus* Nägeli in Kützing, Sp. Algar., p. 200. 1849. —Type from Switzerland: Zürich, Nägeli 369 (L) = PHYTOCONIS BOTRYOIDES (L.) Bory. FIG. 333.
- Protococcus glomeratus* Agardh, Flora 10(2): 629. 1827. *Micraloa olivacea* Kützing, Linnaea 8: 371. 1833. *Chlorococcum glomeratum* Rabenhorst, Fl. Eur. Algar. 3: 59. 1868. —Type from Bohemia: Carlsbad, Agardh (NY) = juvenile NOSTOC sp.
- Protococcus Goetzei* Schmidle, Engler Bot. Jahrb. 30: 252. 1901. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Protococcus grumosus* Richter, Hedwigia 23: 65. 1884. —Type from Germany: ad parietes caldarii in Anger prope Lipsiam, P. Richter, Mar. 1882 (in Wittr. & Nordst., Alg. Exs. 1090, L) = FLAGELLATA.
- Protococcus immanis* Montagne, Ann. Sci. Nat. IV. Bot. 6: 179. 1856. —Type from Bolivia: Andina, Weddel (L) = encysted FLAGELLATES (DINOFLAGELLATES?).
- Protococcus lilacinus* Rabenhorst, Alg. Sachs. 9—10: 81. 1851. *Chroococcus lilacinus* Rabenhorst, Krypt.-Fl. Sachsen 1: 70. 1863. —Isotypes from Germany: in dem steinernen Wassertrog auf dem böhmischen Bahnhofe in Dresden, L. Rabenhorst (FC, L, NY) = BACTERIA. FIG. 326.
- CHROOCOCCUS Subgenus CHRYSOCOCCUS Hansgirg, Notarisia 3: 589. 1888; Prodr. Algenfl. Böhmen 2: 159. 1892. —Type species: *Protococcus macrococcus* Kützing, Phyc. Gener., p. 169. 1843. *Protosphaeria macrococca* Trevisan, Sagg. Monogr. Alg. Coccot., p. 29. 1848. *Chroococcus macrococcus* Rabenhorst, Krypt.-Fl. Sachsen 1: 70. 1863. —Type from Germany: Cohnstein bei Nordhausen, herb. Kützing (L) = encysted PERIDINIUM sp.
- Protococcus marinus* Kützing, Phyc. Gener., p. 169. 1843. *Microcystis marina* Kützing pro synon., loc. cit. 1843. —Isotypes from Trieste, herb. Kützing (FC, MO, UC) = encysted PERIDINIUM sp.
- Protococcus marinus* f. *Foslieanus* Hansgirg in Foslie, Mar. Alg. Norway 1: 159. 1890. —Type

from arctic Norway: Bugonae, M. Foslie, 10 Aug. 1889 (L) = FLAGELLATES.

Protococcus marinus var. *Foslieanus* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 239. 1893. —Type from Croatia: Fiume, A. Hansgirg, 1891 (W) = primordia of CHLOROPHYCEAE.

Protococcus marinus var. *virens* Hansgirg, Sitzungsber. K. Böhm. Ges. Wiss., Math.-Nat. Cl., 1892: 239. 1892. —Type from Istria: Pola, A. Hansgirg, Apr. 1889 (W) = primordia of CHLOROPHYCEAE. FIG. 328.

PLEUROCOCCLUS Untergattung *DICHOCOCCUS* Nägeli, Die Neuern Algensyst., p. 127. 1847. —Type species: *Protococcus miniatus* Kützing, Sp. Algar., p. 203. 1849. *Pleurococcus miniatus* Nägeli, Gatt. Einzell. Alg., p. 64. 1849. —Type from Germany: Freiburg-im-Breisgau, A. Braun (NY) = FLAGELLATES.

Protococcus minor Kützing, Phyc. Germ., p. 144. 1845. *P. minor* α *leprosus* Kützing, Tab. Phyc. 1: 3. 1846. *P. minor* var. *leprosus* Kützing, Sp. Algar., p. 198. 1849. *Chroococcus minor* Nägeli, Gatt. Einzell. Alg., p. 46. 1849. *Pleurococcus minor* Rabenhorst, Krypt.-Fl. Sachsen 1: 127. 1863. *P. vulgaris* β *minor* Kirchner ex Lagerheim, Öfers. K. Sv. Vet.-Akad. Föhr. 1882(2): 79. 1882. *P. vulgaris* var. *minor* Kirchner ex Hansgirg, Prodr. Algenfl. Böhmen 1: 133. 1886. *P. Kuetzingii* G. S. West, Journ. of Bot. 42: 287. 1904. *Protococcus Kuetzingii* G. S. West, Journ. of Bot. 54: 2. 1916. *Gloeocapsa minor* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 238. 1938. —Type from Germany: Nordhausen, herb. Kützing (L) = STICHOCOCCUS SUBTILIS (Kütz.) Klerck. FIG. 324.

Protococcus minor β *mucosus* Kützing, Tab. Phyc. 1: 3, Tab. 3, fig. 22 β . 1846. *P. minor* var. *mucosus* Kützing, Sp. Algar., p. 198. 1849. *Chroococcus minor* f. *mucosus* Rabenhorst, Fl. Eur. Algar. 2: 30. 1865. *C. minor* var. *mucosus* Kützing ex Hansgirg, Prodr. Algenfl. Böhmen 2: 165. 1892. —Type from Germany: Hanau, F. T. Kützing 159 (L) = FLAGELLATES. FIG. 321.

Protococcus Monas β *oblongus* Flotow, Nova Acta Acad. Caes. Leop.-Car. Nat. Cur. 20(2): 478. 1842. —Topotype from Hirschberg, Bohemia, in Rabenh. Alg. Sachs. 71 (FC) = PROTOCOCCLUS GREVILLEI (Ag.) Crouan fr.

Protococcus moniliformis Flotow, Nova Acta Acad. Caes. Leop.-Car. Nat. Cur. 20(2): 459. 1842. —Topotype from Hirschberg, Bohemia, in Rabenh., Alg. Sachs. 71 (FC) = PROTOCOCCLUS GREVILLEI (Ag.) Crouan fr.

Protococcus mucosus Kützing, Phyc. Germ., p. 145. 1845. *Pleurococcus mucosus* Rabenhorst, Krypt.-Fl. Sachsen. 1: 127. 1863. —Type from Germany: Nordhausen, Kützing (L) = BOTRYDIUM GRANULATUM (L.) Grev.

Protococcus natans Agardh ex Wille, Nyt Mag. Naturvid. 56(1): 55. 1918. —Isotype from Bohemia: Carlsbad, ex herb. Agardh (NY) = palmelloid basal parts of STIGEOCLONIUM TENUE (Ag.) Kütz.

Protococcus nebulosus Kützing, Linnæa 8: 365. 1833. *Cryptococcus nebulosus* Kützing, Phyc. Gener., p. 147. 1843. —Type from Germany: in aquae superficie natans, Nordhusae, Kützing (L) = BACTERIA.

Protococcus palustris Kützing, Phyc. Gener., p. 168. 1843. *Pleurococcus palustris* Trevisan, Sagg. Monogr. Alg. Coccot., p. 34. 1848. —Type from Germany: in stagnis prope Halle, herb. Kützing (L) = primordia of CHLOROPHYCEAE.

Protococcus persicinus Diesing in Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 13. 1843. *Pleurococcus persicinus* Rabenhorst, Fl. Eur. Algar. 3: 28. 1868. —Type from the Euganean springs, Italy: "*Protococcus persicinus* Dies." (FI) = BACTERIA.

Protococcus pluvialis β *aquaticus* Kützing, Phyc. Germ., p. 146. 1845. —Topotype from Hirschberg, Bohemia, in Rabenh. Alg. Sachs. 71 (FC) = PROTOCOCCLUS GREVILLEI (Ag.) Crouan fr.

COHNIA Winter, Rabenh. Krypt.-Fl. 1(1): 48. 1884; non Kunth, 1850, non Reichenbach, 1852. *LAMPROCYSTIS* Schröter, Pilze Schlesiens 1: 151. 1886. —Type species: *Protococcus roseo-persicinus* Kützing, Phyc. Germ., p. 146. 1845. *Pleurococcus roseo-persicinus* Rabenhorst, Fl. Eur. Algar. 3: 28. 1868. *Clathrocystis roseo-persicina* Cohn, Hedwigia 12: 58. 1873. *Beggiatoa roseo-persicina* Zopf, Morph. Spaltpfl., p. 30. 1882. *Cohnia roseo-persicina* Winter, Rabenh. Krypt.-Fl. 1(1): 48. 1884. *Lamprocystis roseo-persicina* Schröter, Pilze Schlesiens 1: 801. 1889. *Lamkisteron roseo-persicinus* Ellis, Sulphur Bacteria, p. 135. 1932. —Type from Germany: in Infusione unter Algen, Nordhausen, F. T. Kützing (L) = LAMPROCYSTIS ROSEA (Kütz.) Dr. & Daily.

Protococcus roseus Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 14. 1843. *Pleurococcus roseus* Rabenhorst, Fl. Eur. Algar. 2: 27. 1868. *Chroococcus roseus* Wille, Nyt Mag. Naturvid. 62: 178. 1925. —Type from Italy: ad muros calce illitos, Meneghini (L) = primordia of a LICHEN.

Protococcus rubiginosus Suringar, Obs. Phycol., p. 57. 1855. *Chroococcus rubiginosus* Rabenhorst, Fl. Eur. 2: 43. 1865. —Type from Holland: Sloot Oenkerk, W. F. R. Suringar DDD55c, Jul. 1854 (L) = FLAGELLATA.

Protococcus sabulosus Meneghini in Kützing, Tab. Phyc. 1: 3. 1846. *Protosphaeria sabulosa* Trevisan, Sagg. Monogr. Alg. Coccot., p. 29. 1848. *Haematococcus sabulosus* Trevisan pro synonym.

loc. cit. 1848. *Gloeocapsa sabulosa* Richter in Wittrock & Nordstedt, Alg. Exs. 14: 698. 1884. *Chroococcus sabulosus* Hansgirg, Prodr. Algenfl. Böhmen 2: 164. 1892. —Type from Italy: in exsiccatis, Baenta, Meneghini (L) = FLAGELLATES.

Protococcus salinus Dunal, Ann. Sci. Nat. II. Bot. 9: 1838. —The original description is here designated as the temporary Type = FLAGELLATES.

Protococcus stercorarius Berkeley in Hooker, Bot. Antarct. Voy. Erebus & Terror, 1839—43, 1(2): 501. 1847. *Pleurococcus stercorarius* Berkeley ex Hariot, Mission du Cap Horn, Alg., p. 15. 1889. —Type from Falkland islands: on cow dung, herb. Berkeley (K) = encysted FLAGELLATES. FIG. 322.

Protococcus tectorum Kützing, Tab. Phyc. 1: 4. 1846. *Pleurococcus tectorum* Trevisan, Sagg. Monogr. Alg. Coccot., p. 34. 1848. *P. angulosus* b. *tectorum* Kirchner ex Hansgirg, Prodr. Algenfl. Böhmen 1: 133. 1886. —Type from Germany: Strohdächer, Clausthal, Römer (L) = primordia of CHLOROPHYCEAE.

Protococcus variabilis Hansgirg, Physiol. & Algol. Stud., p. 87. 1887; Oesterr. Bot. Zeitschr. 37: 122. 1887. —Type from Bohemia: Kinsky'scher Garten, Smichow, A. Hansgirg, Sept. 1886 (W) FLAGELLATES. FIG. 322.

Protococcus viridis Agardh, Syst. Algar., p. 13. 1824. *Chlorococcum murorum* Greville, Scott. Crypt. Fl. 6: 325. 1828. *Lepraria murorum* Greville ex Hooker, Engl. Fl. 5(1) [Brit. Fl. 2]: 163. 1833. *Chlorococcum murale* Greville in Meneghini, Consp. Algol. Euan., p. 324. 1837. *C. Agardhii* Meneghini, Giorn. Toscano Sci. Med., Fis. & Nat. 1: 186. 1840. *Haematococcus murorum* Hassall, Hist. Brit. Freshw. Alg. 1: 323. 1845. *Hassallia murorum* Trevisan, Sagg. Monogr. Alg. Coccot., p. 68. 1848. *Pleurococcus murorum* Meneghini ex Trevisan pro synonym., loc. cit. 1848. *Lepra murorum* Schaerer, Enum. Crit. Lich. Eur., p. 241. 1850. *Pleurococcus viridis* Rabenhorst, Krypt.-Fl. Sachsen 1: 127. 1863. —No specimens labeled "*Protococcus viridis*" were found in the herbarium of the Agardhs except for some collected by A. Braun in the 1840's. The original description is here designated as the temporary Type = STICHOOCOCCUS SUBTILIS (Kütz.) Klerck.

Protococcus viridis var. *insignis* Hansgirg, Prodr. Algenfl. Böhmen 1(2): 141. 1888. —Type from Bohemia: Wrsowic nächst Prag, A. Hansgirg, May 1886 (W) = FLAGELLATES. FIG. 329.

Protococcus Wimmeri Hilse in Rabenhorst, Alg. Eur. 103—104: 1031. 1861. *Chlorococcum Wimmeri* Rabenhorst, Fl. Eur. Algar. 3: 60. 1868. *Protococcus viridis* var. *Wimmeri* Wolle, Fresh-w. Alg. U. S., p. 183. 1887. —Type from Silesia (Poland): in fodinis prope Peterwitz, Hilse (in Rabenh.), Alg. Eur. 1031, L) = encysted FLAGELLATES.

PROTOSPHAERIA Turpin, Dict. Sci. Nat., vol. 65 (Végét. Acot.), p. 1. 1816—29. —Type species: *P. simplex* Turpin, loc. cit. 1816—29. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Rhabdoderma Cavanillesianum Gonzalez Guerrero, Anal. Jard. Bot. Madrid 6: 244. 1946. —The original description is here designated as the temporary Type = NOSTOCACEAE.

Rhabdoderma lineare var. *spirale* Woloszynskia, Bull. Int. Acad. Sci. Cracovie, Cl. Sci. Math. & Nat., ser B, 1912: 692. 1913. *Rhabdoderma lineare* f. *spirale* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 44. 1938. —The original description is here designated as the temporary Type = LYNGBYA CONTORTA Lemm.

Rhabdoderma minimum Lemmermann, Arch. f. Hydrobiol. & Planktonk. 4: 187. 1909. —The original description is here designated as the temporary Type = BACTERIA.

Rhabdoderma salinum Tutin, Trans. Linn. Soc. London, ser. 3, 1(2): 200. 1940. —Type from Bolivia: plankton, Lake Poopó, Titicaca region, no. 193/2 (BM) = BACTERIA.

Rhodococcus intermedius Bargagli-Petrucci, N. Giorn. Bot. Ital., N. S., 22(4): 399. 1915. —The original description is here designated as the temporary Type = BACTERIA.

Rhodospaerium diffluens Nadson, Bull. Jard. Imp. Bot. St. Petersburg 8: 113. 1908. —The original description is here designated as the temporary Type = LAMPROCYSTIS ROSEA (Kütz.) Dr. & Daily.

RHODOSPORA Geitler, Oesterr. Bot. Zeitschr. 76: 25. 1927. —Type species: *R. sordida* Geitler, loc. cit. 1927. —The original description is here designated as the temporary Type = RHODOPHYCEAE.

RHODOSTICHUS Geitler & Pascher, Arch. f. Protistenk. 73: 305. 1931. —Type species: *R. expansus* Geitler & Pascher, loc. cit. 1931. —The original description is here designated as the temporary Type = BACTERIA.

Rosaria clandestina Skuja in Handel-Mazzetti, Symbolae Sinicae 1: 18. 1937. —Type from Szechwan, China: heisse Quelle bei Lemoka in Lolo-Lande ostlich von Ningyuen, H. Handel-Mazzetti 1621, 23 Apr. 1914 (W) = HAPALOSIPHON LAMINOSUS (Kütz.) Hansg.

ROSARIA Carter in Compton, Journ. Linn. Soc. Bot. 46: 54. 1922; non Carmichael, 1833. NELLIECARTERIA J. de Toni, Not. Nomencl. Algol. 8. 1936. —Type species: *Rosaria ramosa* Carter, Journ. Linn. Soc. Bot. 46: 54. 1922. *Nelliecarteria ramosa* J. de Toni, Not. Nomencl. Algol. 8. 1836. —Type from New Caledonia: *R. H. Compton* 1181 (in the slide collection, BM) = FUNGI.

Sarcina renis Hepworth, Quart. Journ. Microsc. Soc. 5: 2. 1857. *Merismopodia renis*

Rabenhorst, Fl. Eur. Algar. 2: 59. 1865. —The original description is here designated as the temporary Type = BACTERIA.

SARCINA Goodsir, Edinburgh Med. & Surg. Journ. 57: 434, 437. 1842. —Type species: *S. ventriculi* Goodsir, ibid. p. 433, 437. 1842. *Merismopoedia ventriculi* Robin, Hist. Nat. Végét. Parasites, p. 331. 1853. *M. Goodsirii* Husemann, De Animal. & Vegetab. in Corp. Humano Parasitant., p. 13. 1853. —Paratype, designated here as the Type, in Rabenh., Alg. Sachs. 600 (L) = *SARCINA VENTRICULI* Goods. FIG. 353.

Sarcina Welckeri Rossmann, Zeitschr. f. Wiss. Bot. 40: 643. 1857. *S. vesicae* Rossmann pro synonym., loc. cit. 1857. *S. urinae* Rossmann pro synonym., loc. cit. 1857. *Merismopoedia urinae* Rabenhorst, Fl. Eur. Algar. 2: 59. 1865. —The original description is here designated as the temporary Type = BACTERIA.

SARCODERMA Ehrenberg, Ann. der Phys. & Chem. 18: 504. 1830. —Type species: *S. sanguineum* Ehrenberg, loc. cit. 1830. —The original description is here designated as the temporary Type = EUGLENA sp.

SCHRAMMIA Dangeard, Le Botaniste, ser. 1, 1889: 161. 1889. —Type species: *S. barbata* Dangeard, ibid., p. 158. 1889. —The original description is here designated as the temporary Type = GLOEOCHAETE WITTROCKIANA Lagerh., according to Lagerheim in Nuova Notarisia 1: 227 (1890) = CHLOROPHYCEAE.

Siderocapsa major f. *chromophila* Naumann, K. Sv. Vet.-Akad. Handl. 62(4): 16. 1921. —The original description is here designated as the temporary Type = BACTERIA.

Siderocapsa major f. *chromophoba* Naumann, K. Sv. Vet.-Akad. Handl. 62(4): 16. 1921. —The original description is here designated as the temporary Type = BACTERIA.

SIDEROTHECE Naumann, K. Sv. Vet.-Akad. Handl. 62(4): 17. 1921. —Type species: *S. major* Naumann, loc. cit. 1921. —The original description is here designated as the temporary Type = BACTERIA.

Siderothece minor Naumann, K. Sv. Vet.-Akad. 62(4): 17. 1921. —The original description is here designated as the temporary Type = BACTERIA.

Sorochloris vinosa Kufferath, Bull. Inst. Roy. Sci. Nat. Belg. 26(2): 10. 1950. —Topotype from Belgium: with *Coelosphaerium Leloupii* Kuff., Boirs-sur Geer, L. Brongersma, 28 Nov. 1951 (D, L) = BACTERIA.

Sorospora virescens Hassall, Hist. Brit. Freshw. Alg. 1: 310. 1845. *Microbaloa virescens* Kützinger, Sp. Algar., p. 207. 1849. *Cagniardia virescens* Trevisan, Sagg. Monogr. Alg. Coccot., p. 50. 1848. *Aphanocapsa virescens* Rabenhorst, Fl. Eur. Algar. 2: 48. 1865. —Type from England: Dorset, 1847 (in the slide collection, BM) = FLAGELLATES.

Spbaenosiphon minimus Reinsch, Contrib. Algol. & Fungol. 1: 16. 1874. —Type on *Bryopsis Balbisiana* from Italy: ad Genuum, J. G. Agardh (FC) = BACTERIA.

Spbaenosiphon sorediformis Reinsch, Contrib. Algol. & Fungol. 1: 16. 1874. *Dermocarpa sorediformis* Geitler, Rabenh. Krypt.-Fl. 14: 396. 1932. —Type from the Mediterranean sea: in *Giraudia simplex* (K) = CHLOROPHYCEAE (ENTOCLODIA sp?).

Spbaerogonium gracile Rostafinski, Rozpr. Akad. Umiej. Krakow., Wydz. Math.-Przyr., 10: 293. 1883. *Chamaesiphon Rostafinskii* Hansgirg, Physiol. & Algol. Stud., p. 164. 1887; Oesterr. Bot. Zeitschr. 37: 56. 1887. —Topotype from Polish Ukraine: Siklawika pod Giewontem, M. Raciborski, 3 Oct. 1909 (WU) = juvenile AMPHITHRIX JANTHINA (Mont.) Born. & Flah.

Staurogenia Tetrapedia Kirchner, Jahresh. Ver. Vaterl. Naturk. Württemberg 36: 168. 1880. *Tetrapedia Kirchneri* Lemmermann, Ber. Deutsch. Bot. Ges. 18: 24. 1900. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.

Stichosiphon Hansgirgii Geitler, Rabenh. Krypt.-Fl. 14: 414. 1932. —Type from Bohemia: Johannisbad, A. Hansgirg, Jun. 1885 (W) = AMPHITHRIX JANTHINA (Mont.) Born. & Flah. FIG. 301.

Synechococcus bigranulatus Skuja, Fedde Repert. Sp. Nov. 31: 7. 1933. —The original description is here designated as the temporary Type = PHORMIDIUM LAMINOSUM (Ag.) Gom., hormogonia.

Synechococcus Bosshardii Skuja, Fedde Repert. Sp. Nov. 31: 7. 1933. —The original description is here designated as the temporary Type = PHORMIDIUM LAMINOSUM (Ag.) Gom., hormogonia.

Synechococcus brunneolus Rabenhorst, Krypt.-Fl. Sachsen 1: 75. 1863. —Isotypes with *Sirosiphon coralloides* from Saxony in Rabenh., Alg. Sachs. 224 (FC) = MESOTAENIUM RUBESCENS (Bréb.) Dr. & Daily.

Synechococcus elongatus Geitler, Oesterr. Bot. Zeitschr. 70: 166. 1921. *S. Geitleri* J. de Toni, Noter. Nomencl. Algol. 3. 1936. —Paratype from western Java: Travertin-Hügel von Kuripan, Ruttner (slide BK2b in the collection of L. Geitler) = PHORMIDIUM TENUE (Menegh.) Gom., hormogonia.

Synechococcus fuscus Zeller, Journ. Asiatic Soc. Bengal 42(2): 176. 1873; Hedwigia 12: 169. 1873. —Type from Burma: Yomah, S. Kurz 3258 (L) = mature spores of CYLINDROSPERMUM LICHENIFORME (Bory) Kütz.

- Synechococcus Gaarderi* Alvik, Bergen Mus. Arbok 1934 (Naturvid. Rekke 6): 40. 1934. —The original description is here designated as the temporary Type = BACTERIA.
- Synechococcus intermedius* Gaidner, Mem. New York Bot. Gard. 7: 3. 1927. —Type from Puerto Rico: Caguas, N. Wille 439b, 1915 (NY) = hormogonia of SCYTONEMA HOFMANNII Ag. FIG. 354.
- Synechococcus kerguelensis* Wille, Deutsche Südpolar-Exp., 1901—03, 8: 417. 1928. —The original description is here designated as the temporary Type = BACTERIA.
- Synechococcus roseo-persicinus* Grunow in Rabenhorst, Fl. Eur. Algar. 3: 418. 1863. —Type from Slovakia: in aqua stagnante ad Olascinum Sepusii, C. Kalchbrenner (W) = BACTERIA.
- Synechococcus salinus* Frémy in J. de Toni, Diagn. Alg. Nov., I, Myxophyc. 8: 703. 1946. —The original description is here designated as the temporary Type = BACTERIA.
- Synechococcus ulcericola* Rabenhorst, Fl. Eur. Algar. 3: 418. 1868. —The original description is here designated as the temporary Type = spores of FUNGI.
- COCCOBACTRACEAE** Elenkin, Acta Inst. Bot. Acad. Sci. U. R. S. S., II, 1: 19. 1933. —Type genus: *SYNECHOCYSTIS* Sauvageau, Bull. Soc. Bot. France, ser. 2. 14: cxv. 1892.
- SYNECHOCOCCUS** Subgenus *SYNECHOCYSTIS* Elenkin, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 65. 1923. —Type species: *Synechocystis aquatilis* Sauvageau, Bull. Soc. Bot. France, ser. 2, 14: cxvi. 1892. —Type from Algeria: Hamman-Salahin près Biskra, C. Sauvageau, Apr. 1892 (PC) = palmelloid CHLOROPHYCEAE. FIG. 357.
- Synechocystis salina* Wislouch, Acta Soc. Bot. Polon. 2: 111. 1924. —The original description is here designated as the temporary Type = BACTERIA.
- Tetrachloris merismopedioides* Skuja, Symbolae Bot. Upsal. 9(3): 27. 1948. —The original description is here designated as the temporary Type = BACTERIA.
- Tetrapedia aversa* W. & G. S. West, Journ. of Bot. 35: 301. 1897. —Type from Angola: in stagnis prope Anbilla (Condo), Pungo Andongo, F. Welwitsch 177, Mar. 1857 (BM) = TETRAEDRON sp.
- Tetrapedia crux-Michaeli* Reinsch, Algenfl. Mitth. Th. Franken, p. 38. 1867. *T. crux-melitenensis* Reinsch ex Lemmermann, Krypt.-Fl. Mark Brandenburg. 3: 89. 1907. —The original description is here designated as the temporary Type = PEDIASTRUM sp.
- LEMMERMANNIA** Chodat, Mém. Herb. Boissier 17: 3. 1900. —Type species: *Tetrapedia emarginata* Schröder, Ber. Deutsch. Bot. Ges. 15: 490, 492. 1897. *Lemmermannia emarginata* Chodat, Mém. Herb. Boissier 17: 5. 1900. —The original description is here designated as the temporary Type = CHLOROPHYCEAE.
- Tetrapedia foliacea* Turner, K. Sv. Vet.-Akad. Handl. 25(I, 5): 12. 1892. —The original description is here designated as the temporary Type = CHLOROPHYCEAE (TETRAEDRON sp.?).
- TETRAPEDIACEAE** Elenkin, Acta Inst. Bot. Acad. Sci. U. R. S. S., II, 1: 19. 1933. —Type genus: *TETRAPEDIA* Reinsch, Algenfl. Mitth. Th. Franken, p. 37. 1867; Act. Soc. Senckenb. 6: p. 30 of reprint. 1867. —Type species: *T. gothica* Reinsch, loc. cit. 1867. —The original descriptions are here designated as the temporary Type = TETRAEDRON sp.
- Tetrapedia morsa* W. & G. S. West, Trans. Linn. Soc. Bot., ser. 2, 5: 85. 1895. —Type from Madagascar: near Lake Alastra, R. Baron 3 (BIRM) = TETRAEDRON sp.
- Tetrapedia Penzigiana* de Toni, Hedwigia 1891: 195. 1891. —The original description is here designated as the temporary Type = PEDIASTRUM sp.
- Tetrapedia Reinschiana* Archer, Quart. Journ. Microsc. Sci., N. S., 12: 364. 1872. —The original description is here designated as the temporary Type = TETRAEDRON sp.
- Tetrapedia setigera* Archer, Quart. Journ. Microsc. Sci., N. S., 12: 365. 1872. *Polyedrium trigonum* var. *setigerum* Schröder, Forschungsber. Biol. Sta. Plön 6: 23. 1898. *Tetradron trigonum* var. *setigerum* Lemmermann, Arch. f. Bot. 2(2): 110. 1904. *Treubaria setigera* G. M. Smith, Fresh-w. Alg. U. S., p. 499. 1933. —The original description is here designated as the temporary Type = TETRAEDRON sp.
- Tetrapedia trigona* W. & G. S. West, Journ. Linn. Soc. Bot. 30: 277. 1894. —Type from St. Vincent, British West Indies: with *Cosmarium pseudopyramidatum*, W. R. Elliott 477A (in the slide collection, BM) = TETRAEDRON sp.
- Tetrapedia Wallichiana* Turner, K. Sv. Vet.-Akad. Handl. 25(I, 5): 12. 1892. —The original description is here designated as the temporary Type = PEDIASTRUM sp.
- Tetraspora didyma* Liebmann, Naturh. Tidskr. 2: 473. 1838—39. —Type from Denmark: in amne ad Nyemolle, Liebmann (C) = TETRASPORA GELATINOSA (Vauch.) Desv.
- Thelephora sanguinea* Persoon, Syn. Meth. Fung., p. 575. 1801. *Palmella sanguinea* Ehrenberg, Ann. der Physik & Chem. 18: 510. 1830. —Type labeled: "Thelephora sanguinea", Greville, in herb. Persoon (L) = FECES OF INSECTS.
- THIOPEdia** Winogradsky, Beitr. a. Morphol. & Physiol. der Bacteria 1: 85. 1888. —Type species: *T. rosea* Winogradsky, loc. cit. 1888. *Lampropedia rosea* de Toni & Trevisan in Saccardo, Syll. Fung. 8: 1049. 1889. —The original description is here designated as the temporary Type = ERYTHROCONIS LITTORALIS Oerst.
- MERRETTIA** S. F. Gray, Nat. Arr. Brit. Pl., p. 348. 1821. —Type species: *Tremella adnata*

Linnaeus, Sp. Plant., ed. 2, 2: 1626. 1763. *Palmella adnata* Lyngbye, Tent. Hydrophyt. Dan., p. 205. 1819. *Merrettia adnata* S. F. Gray, Nat. Arr. Brit. Pl., p. 348. 1821. *Microcystis adnata* Meneghini, Mem. R. Accad. Sci. Torino, ser. 2, 5 (Sci. Fis. & Mat.): 47. 1843. *Bichatia adnata* Trevisan, Nomencl. Algar. 1: 59. 1845. *Gloeocystis adnata* Nägeli, Gatt. Einzell. Alg., p. 65. 1849. —The original description is here designated as the temporary Type = LICHEN?

PORPHYRIDIDIUM Nägeli, Gatt. Einzell. Alg., p. 71. 1849. **RHODOCOCCLUS** Sectio **PORPHYRIDIDIUM** Hansgirg, Oesterr. Bot. Zeitschr. 34: 315. 1884. **APHANOCAPSA** Subgenus **PORPHYRIDIDIUM** Hansgirg, Prodr. Algenfl. Böhmen 2: 154. 1892. —Type species: *Tremella cruenta* Smith & Sowerby, Engl. Bot. 25: 1800. 1807. *Olivia cruenta* S. F. Gray, Nat. Arr. Brit. Pl., p. 350. 1821. *Palmella cruenta* Agardh, Syst. Algar., p. 15. 1824. *Coccochloris cruenta* Sprengel, Linn. Syst. Vegetab., ed. 16, 5(1): 373. 1827. *Phytoconis cruenta* Trevisan, Prosp. Fl. Eugan., p. 57. 1842. *Porphyridium cruentum* Nägeli, Gatt. Einzell. Alg., p. 71. 1849. *Aphanocapsa cruenta* Hansgirg, Ber. Deutsch. Bot. Ges. 3: 16. 1885; Bot. Centralbl. 22: 55. 1885. —Type from London, England (BM) = **PORPHYRIDIDIUM CRUENTUM** (Sm. & Sow.) Näg.

TRICHODICTYON Kützing, Phyc. Germ., p. 153. 1845. —Type species: *T. rupestre* Kützing, loc. cit. 1845. *Penium rupestre* Rabenhorst, Fl. Eur. Algar. 3: 120. 1868. *Gyges rupestris* Kuntze, Rev. Gen. Pl. 2: 896. 1891. *Cylindrocystis rupestris* Dalla Torre & Sarnthein, Fl. Tirol, Vorarl. & Liechtenst. 2: 59. 1901. —Type from Germany: an feuchten Felsen, Clausthal, Römer (L) = **MESOTAENIUM RUBESCENS** (Bréb.) Dr. & Daily.

TUBIELLACEAE Elenkin, Sovietsk. Bot. 2(5): 56. 1934. —Type genus: *TUBIELLA* Hollerbach in Elenkin, loc. cit. 1934; Hollerbach, Acta Inst. Bot. Acad. Sci. U. R. P. S. S., II, 2: 34. 1935. —Type species: *T. Elenkinii* Hollerbach, loc. cit. 1934, 1935. —The original description is here designated as the temporary Type = young **NOSTOC** sp.

HYDROGASTRUM Desvaux, Obs. sur les Pl. des Env. d'Angers, p. (18). 1818. **DESMAZIERELLA** Gaillon, Aperçu d'Hist. Nat., p. 33. 1833. —Type species: *Ulva granulata* Linnaeus, Sp. Plant., p. 1164. 1753. *Tremella globosa* Weis, Pl. Crypt. Fl. Gottingens., p. 28. 1770. *Linckia granulata* Weber in Wiggers, Primit. Fl. Holsat., p. 94. 1780. *Hydrogastrium granulatum* Desvaux, Obs. sur les Pl. des Env. d'Angers, p. (19). 1818. *Vaucheria radicata* Agardh, Syst. Algar., p. 173. 1824. *Coccochloris radicata* Sprengel, Linn. Syst. Vegetabil., ed. 16, 4(1): 372. 1827. *Botrydium granulatum* Greville, Alg. Brit., p. 196. 1830. *Desmazierella granulata* Gaillon, Aperçu d'Hist. Nat., p. 33. 1833. —Type in the Linnaean herbarium in the Linnaean Society of London = **BOTRYDIUM GRANULATUM** (L.) Grev.

SCYTHYMENIA Agardh, Syst. Algar., xx. 1824. —Type species: *Ulva rupestris* Smith & Sowerby, Engl. Bot. 31: 2194. 1810. *Merrettia coriacea* S. F. Gray, Nat. Arr. Brit. Pl., p. 348. 1821. *Scythymenia rupestris* Agardh, Syst. Algar., p. 30. 1824. —Type from England: E. B. 2194, Dr. Smith in herb. Sowerby (BM) = **STIGONEMA MINUTUM** (Ag.) Hass.

PROTOCOCCUS Agardh, Syst. Algar., p. xvii. 1824. —Type species: *Uredo nivalis* Bauer, Quart. Journ. Lit., Sci. & Arts 7: 225. 1819. *Globulina sanguinea* Turpin, Dict. Sci. Nat. 65 (Végét. Acot.): pl. 7, fig. 1. 1816—29; Mém. Mus. d'Hist. Nat. Paris 14: 26, 63. 1827. *Protococcus nivalis* Agardh, Syst. Algar., p. 13. 1824. *Sphaerella nivalis* Sommerfelt, Mag. f. Naturvid. 4: 252. 1824. *Palmella nivalis* Hooker, Append. Parry's Journ., 2nd Voy. 1821—23, p. 428. 1825. *Coccochloris nivalis* Sprengel, Linn. Syst. Vegetabil., ed. 16, 4(1): 373. 1827. *Coccophysium nivale* Link, Handb. Erkenn. Gewächse 3: 342. 1833. *Chlamydomonas nivalis* Wille, Nyt Mag. Naturvid. 41(1): 147. 1903. —Type from Baffin bay, Canada: "specimen ex itinere Rossii" in herb. Agardh (LD) = **PROTOCOCCUS NIVALIS** (Bauer) Ag.

Xenococcus Schousboei var. *pallidus* Hansgirg, Oesterr. Bot. Zeitschr. 39: 5. 1889. —Type from Dalmatia: Zara, A. Hansgirg, Aug. 1888 (W) = primordia of **CHLOROPHYCEAE**. FIG. 358.

ZACHARIASIA Lemmermann, Forschungsber. Biol. Sta. Plön 3: 60. 1895. —Type species: *Z. endophytica* Lemmermann, loc. cit. 1895. —The original description is here designated as the temporary Type = **RHODOPHYCEAE**, according to Geitler & Matfeld in Engler & Prantl, Natürl. Pflanzenfam., ed. 2, lb: 225 (1942).

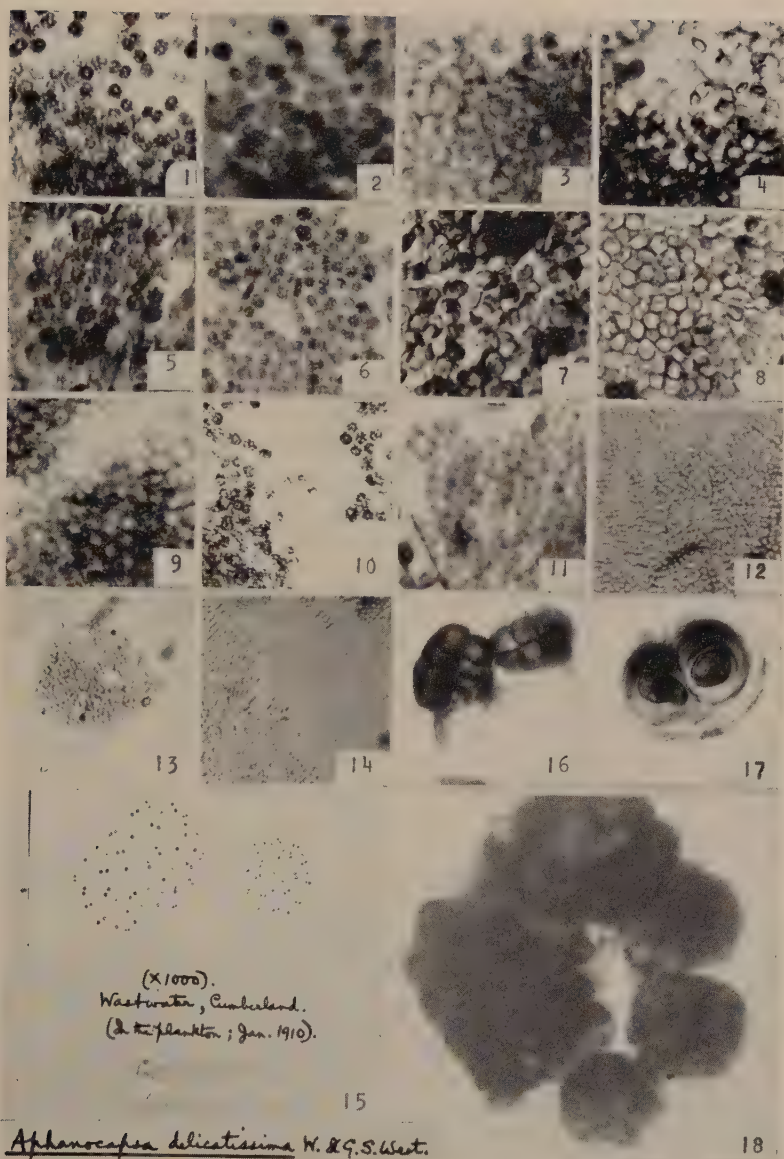
ILLUSTRATIONS

The photomicrographs were made from herbarium material mounted in water or dilute solutions of detergents on mica slips or glass slides. At the magnification (430 X) and with the equipment used, 1 millimeter equals 2.0 microns. Mrs. Fay K. Daily processed the films and made the prints reproduced here.

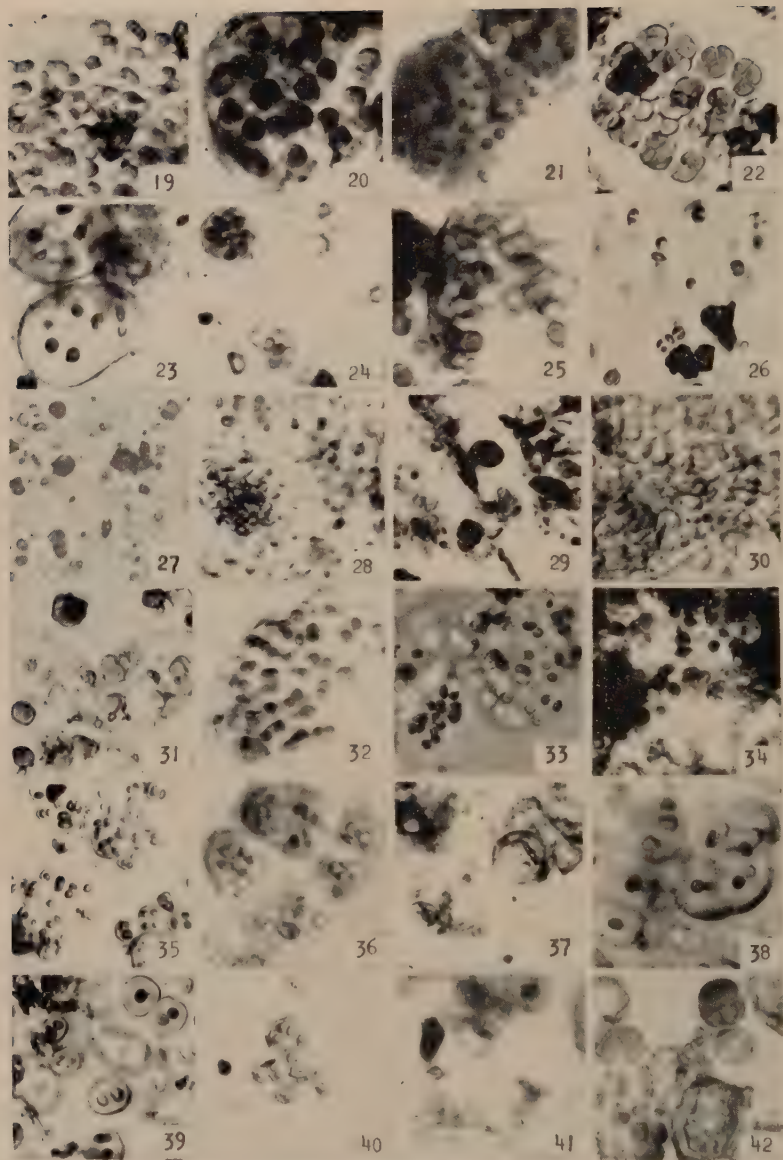
The prints for Figs. 15, 90A, 107, 142, 144, 162, 175 and 311 were

prepared from negatives taken by members of the staffs of the British Museum (Natural History), London, and the Eidgenössische Technische Hochschule, Zürich.

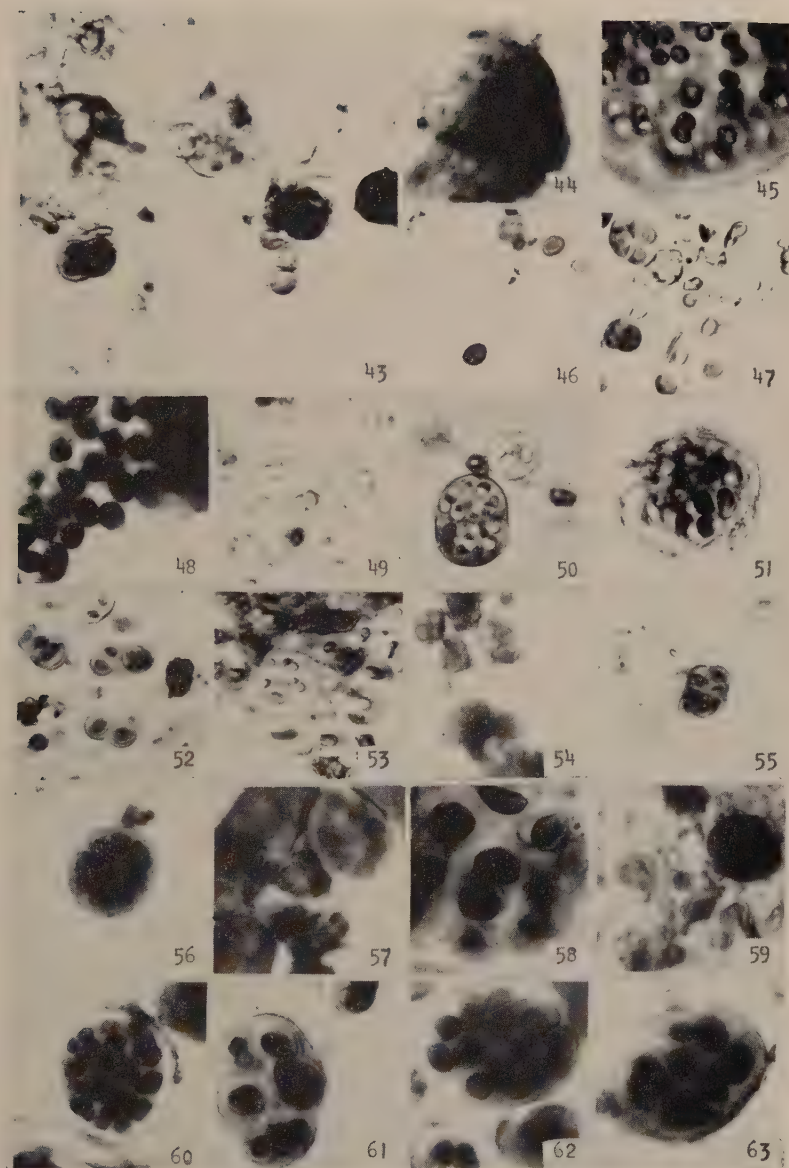
<i>Coccochloris aeruginosa</i> (Näg.) Dr. & Daily	Figs. 143—144.
<i>Coccochloris stagnina</i> Spreng.	Figs. 145—163.
<i>Coccochloris elabens</i> (Bréb.) Dr. & Daily	Figs. 164—169.
<i>Coccochloris Peniocyttis</i> (Kütz.) Dr. & Daily	Figs. 170—172.
<i>Anacyttis cyanea</i> (Kütz.) Dr. & Daily	Figs. 1—11.
<i>Anacyttis incerta</i> (Lemm.) Dr. & Daily	Figs. 12—15.
<i>Anacyttis marina</i> (Hansg.) Dr. & Daily	Figs. 376—377.
<i>Anacyttis montana</i> (Lightf.) Dr. & Daily f. <i>montana</i>	Figs. 16—90A.
<i>Anacyttis montana</i> f. <i>minor</i> (Wille) Dr. & Daily	Figs. 91—97.
<i>Anacyttis montana</i> f. <i>gelatinosa</i> (Henn.) Dr. & Daily	Figs. 98—99.
<i>Anacyttis dimidiata</i> (Kütz.) Dr. & Daily	Figs. 100—107.
<i>Anacyttis aeruginosa</i> (Zanard.) Dr. & Daily	Figs. 108—113.
<i>Anacyttis thermalis</i> (Menegh.) Dr. & Daily f. <i>thermalis</i>	Figs. 114—129.
<i>Anacyttis thermalis</i> f. <i>major</i> (Lagerh.) Dr. & Daily	Figs. 130—132.
<i>Johannesbaptistia pellucida</i> (Dickie) W. R. Taylor & Dr.	Figs. 182—184.
<i>Agmenellum quadruplicatum</i> (Menegh.) Bréb.	Fig. 133.
<i>Agmenellum thermale</i> (Kütz.) Dr. & Daily	Figs. 134—142.
<i>Microcrocis geminata</i> (Lagerh.) Geitl.	Fig. 181
<i>Gomphosphaeria Wichurae</i> (Hilse) Dr. & Daily	Figs. 173, 174 & 177.
<i>Gomphosphaeria lacustris</i> Chod.	Figs. 175—176.
<i>Gomphosphaeria aponina</i> Kütz.	Figs. 178—180.
<i>Entophysis deusta</i> (Menegh.) Dr. & Daily	Figs. 185—194, 247—250.
<i>Entophysis endophytica</i> (Howe) Dr. & Daily	Fig. 195.
<i>Entophysis conferta</i> (Kütz.) Dr. & Daily	Figs. 196—215.
<i>Entophysis rivularis</i> (Kütz.) Dr. f. <i>rivularis</i>	Figs. 216—220, 222—234.
<i>Entophysis rivularis</i> f. <i>papillosa</i> (Kütz.) Dr. & Daily	Figs. 374—375.
<i>Entophysis Lemaniae</i> (Ag.) Dr. & Daily f. <i>Lemaniae</i>	Figs. 221, 235—245.
<i>Entophysis Lemaniae</i> f. <i>elongata</i> (Wille) Dr. & Daily	Fig. 246.
<i>Clastidium setigerum</i> Kirchn.	Figs. 251—252.
<i>Stichosiphon sansibaricus</i> (Hieron.) Dr. and Daily	Figs. 253—254.
<i>Palmogloea protuberans</i> (Sm. & Sow.) Kütz.	Figs. 255—298.
EXCLUDENDA CETERA	Figs. 299—373.



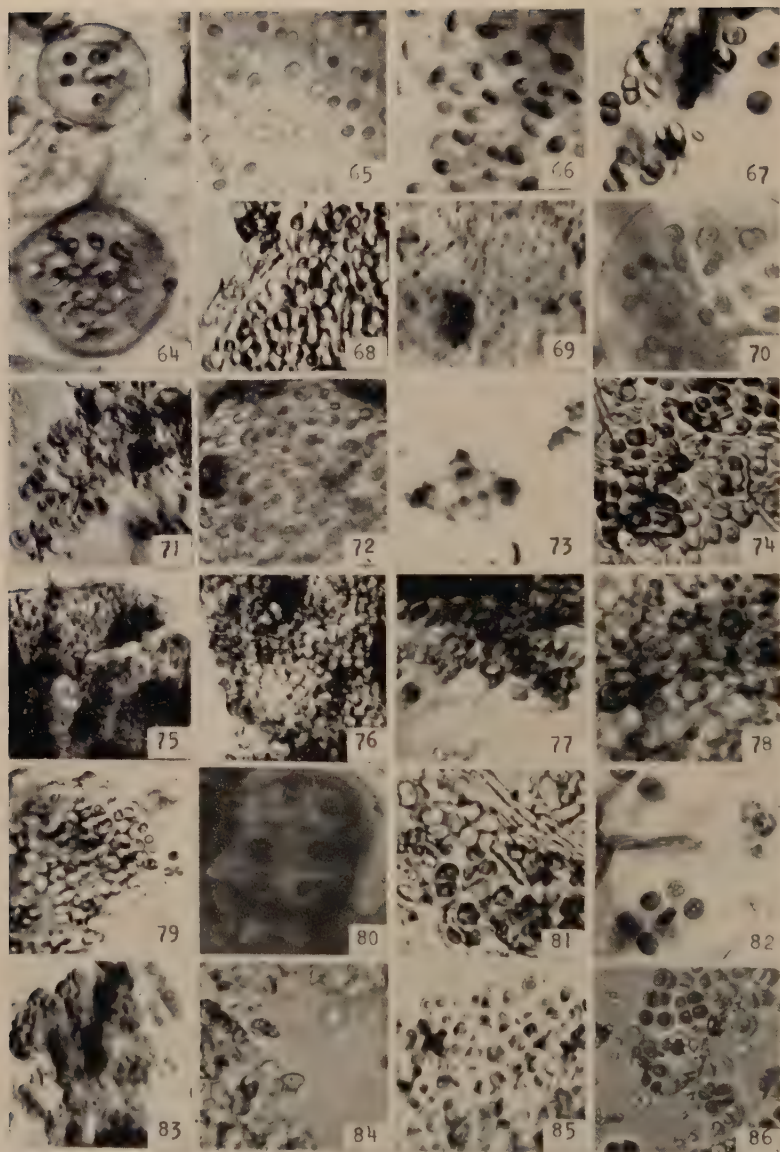
Figs. 1-18.—1. *Microcystis toxica* Stephens, Type, L. 2. *Polycystis scripta* Richter, Type, B. 3. *Polycystis ochracea* Brand, Type, B. 4. *Polycystis flos-aquae* Wittrock, Type, S. 5. *Microcystis protocystis* Crow, Type in coll. of F. E. Fritsch. 6. *Polycystis prasina* Wittrock, Type, S. 7. *Polycystis aeruginosa* var. *major* Wittrock, Isotype, FC. 8. *Chroococcus indicus* Zeller, Type, L. 9. *Micraloa aeruginosa* Kützing, Type, L. 10. *Polycystis* (*Clathrocystis*) *insignis* Beck, Isotype, FC. 11. *Clathrocystis robusta* Clark, Type, FC. 12. *Aphanothece clathrata* var. *rosea* Skuja, Paratype, D. 13. *Microcystis pallida* Migula, Isotype, FC. 14. *Aphanocapsa minima* Migula, Isotype, FC. 15. *Aphanocapsa delicatissima* W. & G. S. West, West notes, BM. 16. *Gloeocapsa scopulorum* Nägeli, Type, L. 17. *Gloeocapsa alpina* Nägeli, Type, FC. 18. *Entophysalis atrovioacea* Novacek, Type, D.



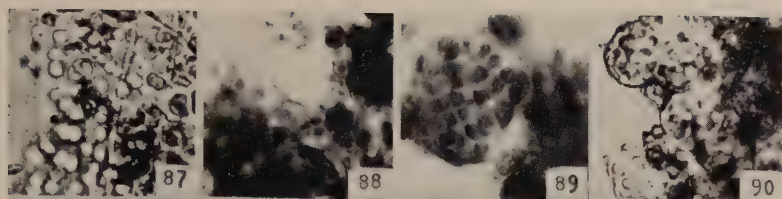
Figs. 19-42.—19. *Anacystis marginata* Meneghini, Type, L. 20. *Anacystis amplivesiculata* Gardner, Type, NY. 21. *Gloeocapsa multispherica* Gardner, Type, FH. 22. *Gloeocapsa saxicola* Wartmann, Type, FC. 23. *Gloeocapsa ianthina* Nägeli, Type, L. 24. *Endospora nigra* Gardner, Type, NY. 25. *Anacystis compacta* Gardner, Type, NY. 26. *Cbroococcus muralis* Gardner, Type, NY. 27. *Protococcus pygmaeus* Kützing, Type, L. 28. *Aphanothece opalescens* Gardner, Type, NY. 29. *Endospora mellea* Gardner, Type, NY. 30. *Aphanocapsa bififormis* A. Braun, Type, FC. 31. *Cbroococcus cubicus* Gardner, Type, NY. 32. *Aphanocapsa intertexta* Gardner, Type, NY. 33. *Gloeocapsa geminata* Kützing, Type, L. 34. *Endospora bicoccus* Gardner, Type, NY. 35. *Gloeotheca parrula* Gardner, Type, NY. 36. *Gloeocapsa tropica* Crouan, Type, PC. 37. *Gloeocapsa Shuttleworthiana* Kützing, Type, L. 38. *Haematococcus frustulosus* Harvey, Type, K. 39. *Gloeocapsa calcicola* Gardner, Type, NY. 40. *Pleurocapsa Mayorii* Setchell, Type, UC. 41. *Endospora olivacea* Gardner, Type, NY. 42. *Gloeocapsa violacea* Kützing, Type, L.



Figs. 43-63.—43. *Gloeocapsa compacta* var. *coeruleoatra* Novacek, Type, D. 44. *Anacystis gloeocapsoides* Gardner, Type, NY. 45. *Gloeocapsa alpina* var. *mediterranea* Hansgirg, Isotype, FC. 46. *Protococcus fusco-ater* Kützing, Type, L. 47. *Gloeocapsa nigrescens* f. *virrea* Novacek, Type, D. 48. *Monocapsa stegophila* Itzigsohn, Type, FC. 49. *Gloeocapsa compacta* Kützing, Type, L. 50. *Gloeocapsa versicolor* Nägeli, Type, L. 51. *Anacystis radiata* var. *major* Gardner, Type, NY. 52. *Gloeocapsa livida* var. *minor* Gardner, Type, NY. 53. *Gloeotheca endochromatica* Gardner, Type, NY. 54. *Gloeocapsa chroococcoides* Novacek, Type, D. 55. *Aphanothece saxicola* var. *sphaerica* W. & G. S. West, Type, BIRM. 56. *Anacystis radiata* var. *major* Gardner, Type, NY. 57. *Endospora rubra* Gardner, Type, NY. 58. *Anacystis magnifica* Gardner, Type, NY. 59. *Gloeocapsa Dvorakii* Novacek, Type, D. 60. *Anacystis radiata* Gardner, Type, NY. 61. *Gloeocapsa sanguinolenta* Kützing, Type, L. 62. *Anacystis nidulans* Gardner, Type, NY. 63. *Anacystis pulchra* Gardner, Type, NY.



Figs. 64-86.—64. *Microcystis nigra* Meneghini, Type, FI. 65. *Palmella livida* Carmichael, Type, K. 66. *Placoma Willei* Gardner, Type, NY. 67. *Synechococcus ambiguus* Skuja, Isotype, FC. 68. *Gloeotheca repidarium* var. *cavernarum* Hansg. Isotype, FC. 69. *Aphanocapsa nebulosa* A. Braun, Type, FC. 70. *Gloeocapsa baematodes* var. *violascens* Grunow, Type, W. 71. *Aphanocapsa thermalis* var. *minor* Hansg. Isotype, FC. 72. *Gloeotheca rhodochlamys* Skuja, Type, FC. 73. *Anacystis minutissima* Gardner, Type, NY. 74. *Chroococcus viridis* var. *luteolus* Hansg. Isotype, FC. 75. *Anacystis nigropurpurea* Gardner, Type, NY. 76. *Coelosphaerium limnicola* Lund, Type, in coll. of J. W. G. Lund. 77. *Coccolioris parietina* Meneghini, Type, FI. 78. *Chroococcus cohaerens* Nägeli, Type, FC. 79. *Coccolioris muscicola* Meneghini, Type, FI. 80. *Palmella sanguinea* Agardh, Type, LD. 81. *Gloeocapsa conglomerata* Kützing, Type, L. 82. *Chondrocystis Bracei* Howe, Type, NY. 83. *Pleurococcus communis* Meneghini, Type, FI. 84. *Haematococcus aeruginosus* Hassall, Type, K. 85. *Chroococcus varius* f. *atrovirens* A. Braun, Type, FC. 86. *Chroococcus violaceus* Rabenhorst, Type, L.



Palmella brunnea A. Bra. ?
Synechococcus parvulus Näg.

Longifolia

Nov. 47

P. longifolia *longifolia*

Sm = 0,001

366

Length = 0,0015

Width = 0,001

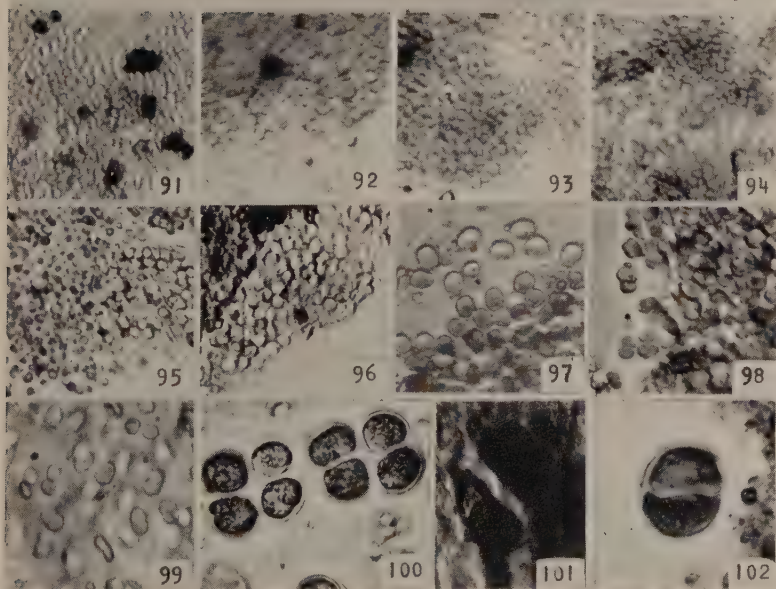
Size by this method 0,112" long x 0,001" broad/area

gels, fungus; both fresh, almost no branching, - proof.

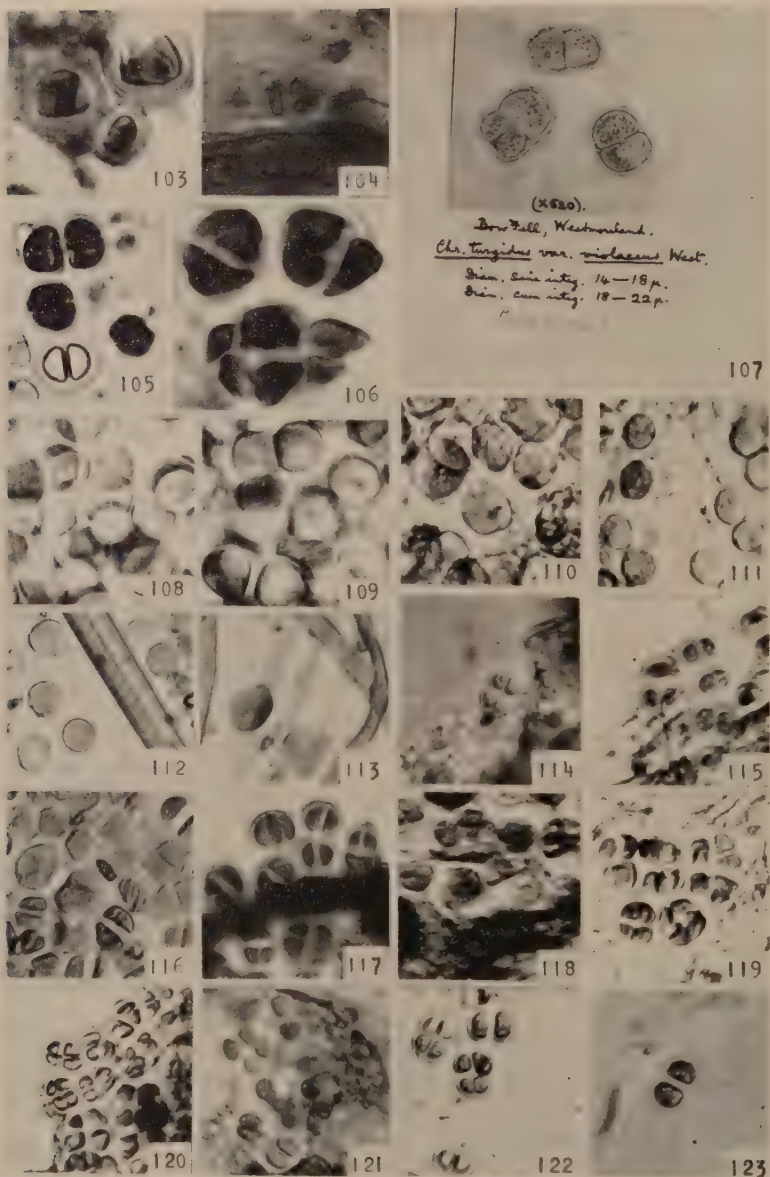
Membranary.

Length 0,001 - 0,0015

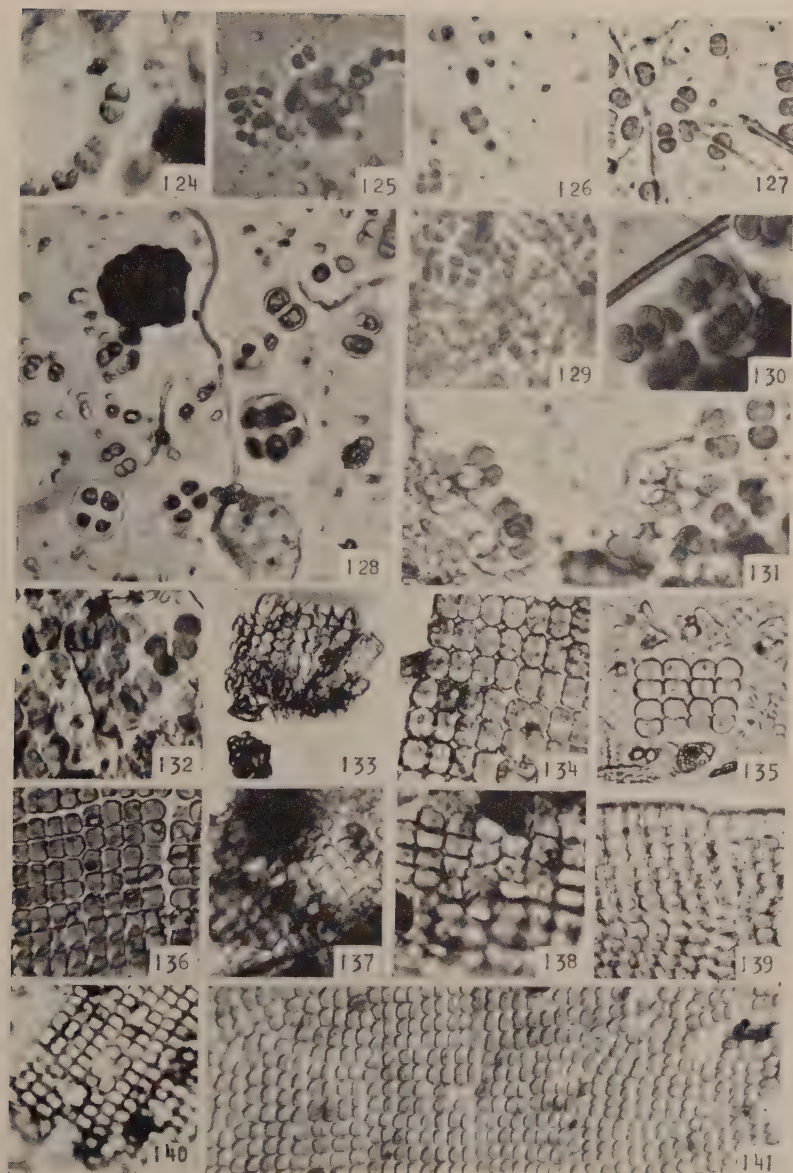
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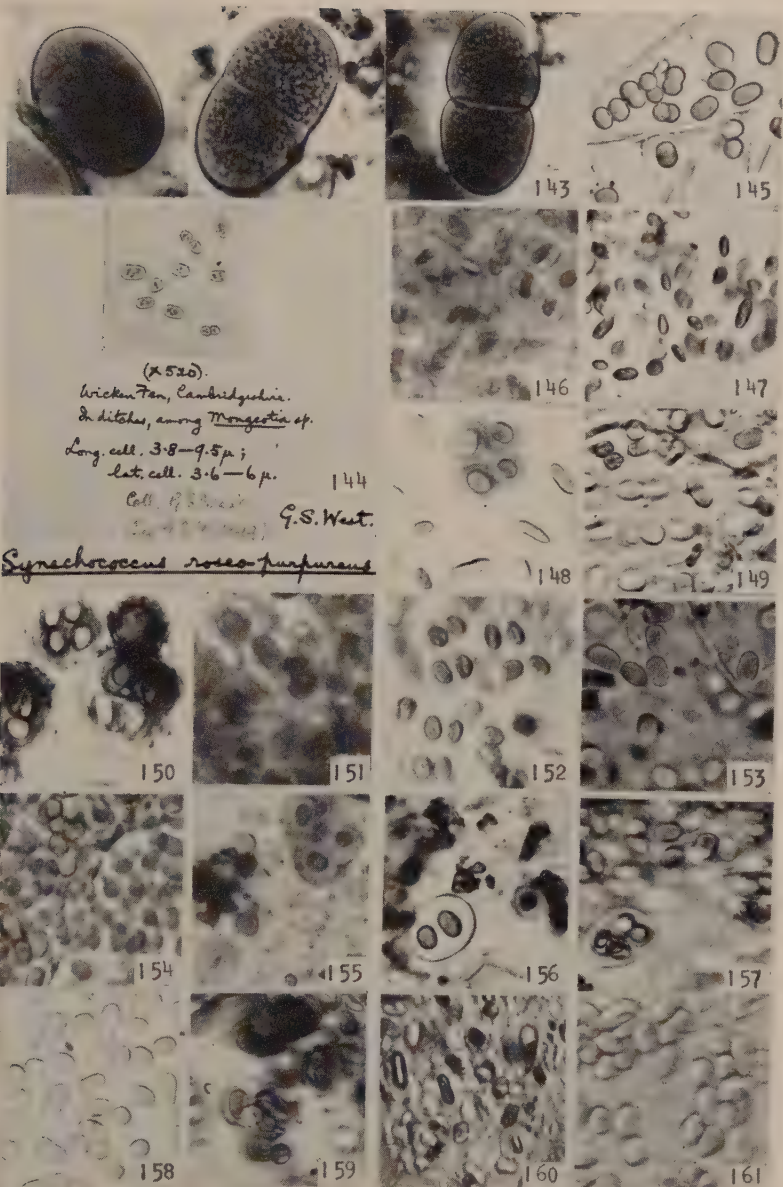
Figs. 87-102.—87. *Palmella brunnea* A. Braun, Type, L. 88. *Protococcus haematodes* Kützinger, Type, L. 89. *Gloeocapsa pleurocapsoides* Novacek, Type, D. 90. *Gloeocapsa aeruginosa* Kützinger, Type, L. 90A. *Synechococcus parvulus* Nägeli, from Nägeli notes in Zürich. 91. - *Chroococcus parallelepipedon* Schmidle, Type, ZT. 92. *Aphanocapsa Farlowiana* Drouet & Daily, Type, D. 93. *Anacystis glauca* Wolle, Type, FC. 94. *Palmella sudetica* Rabenhorst, Type, L. 95. *Palmella hyalina* γ *seriata* Kützinger, Type, L. 96. *Nostoc microscopium* var. *linguiforme* Hansgirg, Isotype, FC. 97. *Aphanocapsa elachista* var. *irregularis* Boye Petersen, Type in coll. of J. Boye Petersen. 98. *Coccochloris stagnina* f. *gelatinosa* Hennings, Type, S. 99. *Synechocystis* Willei Gardner, Type, NY. 100. *Protococcus turgidus* Kützinger & β *fuscescens* Kützinger, Type, L. 101. *Chroococcus* (*Rhodococcus*) *insignis* Schmidle, Type, ZT. 102. *Chroococcus turgidus* var. *Hookeri* Lagerheim, Type, S.



Figs. 103-123.—103. *Chroococcus schizodermaticus* var. *badio-purpureus* W. & G. S. West, Type, BM. 104. *Chroococcus turgidus* var. *submarinus* Hansgirg, Isotype, FC. 105. *Trochiscia dimidiata* Kützing, Type, L. 106. *Chroococcus giganteus* var. *occidentalis* Gardner, Type, NY. 107. *Chroococcus turgidus* var. *violaceus* West, in West notes, BM. 108. *Chroococcus smaragdinus* Hauck, Type, L. 109. *Aphanocapsa Howeii* Collins, Type, NY. 110. *Palmogloia aeruginosa* Zanardini, Type, L. 111. *Aphanocapsa sesciacensis* Fremy, Type, NY. 112. *Chroococcus Raspaigellae* Hauck, Type, L. 113. *Aphanocapsa Feldmannii* Fremy, Type, NY. 114. *Chroococcus helveticus* Nägeli, Paratype, FC. 115. *Aphanocapsa ovalis* Gardner, Type, NY. 116. *Chroococcus rirescens* Hantzsch, Type, L. 117. *Chroococcus subsphaericus* Gardner, Type, NY. 118. *Aphanocapsa salinarum* Hansgirg, Isotype, FC. 119. *Chroococcus helveticus* var. *aureo-fuscus* Hansgirg, Isotype, FC. 120. *Chroococcus turgidus* var. *glomeratus* Hansgirg, Isotype, FC. 121. *Chroococcus mediocris* Gardner, Type, NY. 122. *Chroococcus helveticus* var. *aurantio-fuscus* Hansgirg, Isotype, FC. 123. *Pleurococcus membraninus* Meneghini, Type, FI.



Figs. 124-141.—124. *Gloeocapsa calcarea* Tilden, Type, MIN. 125. *Plenrococcus cohaerens* Brébisson, Cotype, L. 126. *Chroococcus membraninus* var. *crassior* Hansgirg, Isotype, FC. 127. *Palmella testacea* A. Braun, Type, L. 128. *Chroococcus decorticans* A. Braun, Type, L. 129. *Protococcus pallidus* Nägeli, Type, L. 130. *Chroococcus Prescottii* Drouet & Daily, Type, D. 131, 132. *Chroococcus helveticus* f. *major* Lagerheim, Type, NY. 133. *Merismopoedia glauca* var. *fontinalis* Hansgirg, Isotype, FC. 134. *Merismopoedia elegans* A. Braun, Type, L. 135. *Merismopoedia major* Kützing, Type, L. 136. *Merismopoedia aeruginea* Brébisson, Type, L. 137. *Merismopoedia Willei* Gardner, Type, NY. 138. *Merismopoedia glauca* subsp. *amethystina* Lagerheim, Isotype, L. 139. *Merismopoedia convoluta* Brébisson, Type, L. 140. *Merismopoedia thermalis* Kützing, Type, L. 141. *Prasiola Gardneri* Collins, Type, NY.



Figs. 143-161.—143. *Synechococcus major* f. *crassior* Lagerheim, Type, S. 144. *Synechococcus roseo-purpureus* G. S. West, from West notebooks, BM. 145. *Protococcus minutus* Kützing, Type, L. 146. *Gloeocapsa quaternata* var. *major* Gardner, Type, NY. 147. *Aphanothece Naegeli* Wartmann, Type, ZT. 148. *Palmella rupestris* Lyngbye, Type, C. 149. *Gloeothoece decipiens* A. Braun, Type, L. 150. *Chroococcus montanus* Hansgirg, Isotype, FC. 151. *Aphanothece microscopica* var. *granulosa* Gardner, Type, NY. 152. *Microcystis paroliniana* Meneghini, Type, FL. 153. *Palmella heterococca* Kützing, Type, L. 154. *Coccochloris stagnina* Sprengel, Type, FC. 155. *Gloeothoece interspersa* Gardner, Type, NY. 156. *Anacystis cylindracea* Gardner, Type, NY. 157. *Gloeocapsa repidiariorum* A. Braun, Type, L. 158. *Palmella Mooreana* Harvey, Type, K. 159. *Gloeocapsa Kuetzingiana* Nägeli, Type, L. 160. *Aphanothece conferta* var. *brevis* Gardner, Type, NY. 161. *Aphanothece* (*stagnina* var.) *prasina* A. Braun, Type, FC.

Microscopica

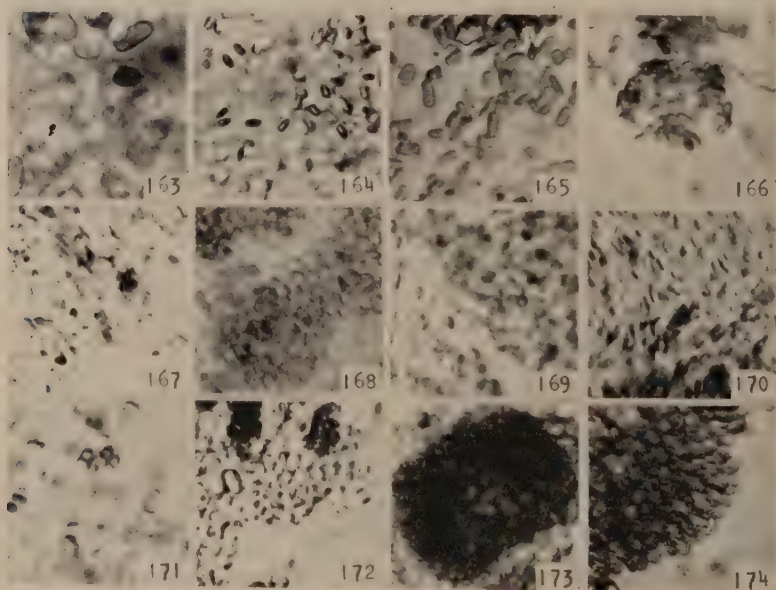
Langman Dec 1842

↓ Long, 0.045. Full Long 0.04 - 0.03 - 0.05
Rate — 0.032 — 0.002

Hydrococcus Langman

Long, 0.045. Full 0.002
Lang, 0.03 - 4. 0.005
in some particles yellowish (0.0100 -

162



Figs. 162-174.—162. *Aphanothece microscopica* Nägeli, from Nägeli notes, Zürich. 163. *Gloeocapsa gelatinosa* Kützinger, Type, L. 164. *Polysistis Packardii* Farlow, Type, FH. 165. *Aphanothece Lebrunii* DuVigneaud & Symoens, Type, BR. 166. *Aphanothece conglomerata* Rich. Type, D. 167. *Synechococcus curtus* Setchell, Type, UC. 168. *Micraloa elabens* Brébisson, Type, L. 169. *Aphanothece utabensis* Tilden, Type, MIN. 170. *Aphanothece saxicola* var. *aquatica* Wittrock, Type, S. 171. *Gloeotheca prototypa* Gardner, Type, NY. 172. *Aphanothece subachroa* Hansgirg, Isotype, FC. 173. *Coelosphaerium Wichuriae* Hilse, Type, FC. 174. *Hydrococcum genuense* de Notaris, Isotype, FC.

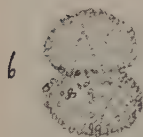
Coelosphaerium kuetzingianum
Näg.

Large Sept 1867.



dia 0,020
Zirk = 0,008
Zirk & Zirk etwa 400'

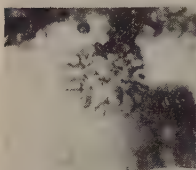
gelb färbig, Randlich grün
Hauptm. & Stacheln wie Gullachschel
(= Gullachschel auf 2 Lagen), nicht für
Kinetenring.



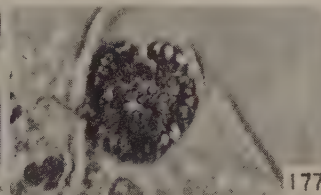
Morphologie ähnlicher Organismen (6)

175

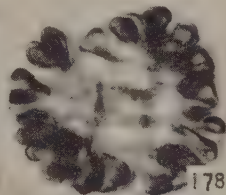
Thompson's use of the formula $R = \frac{D^2 \cdot 3,61}{\pi^2}$, the value of R is 0,008 in D measured



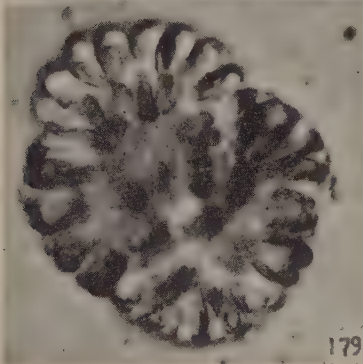
176



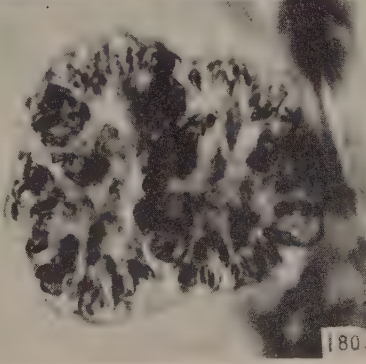
177



178

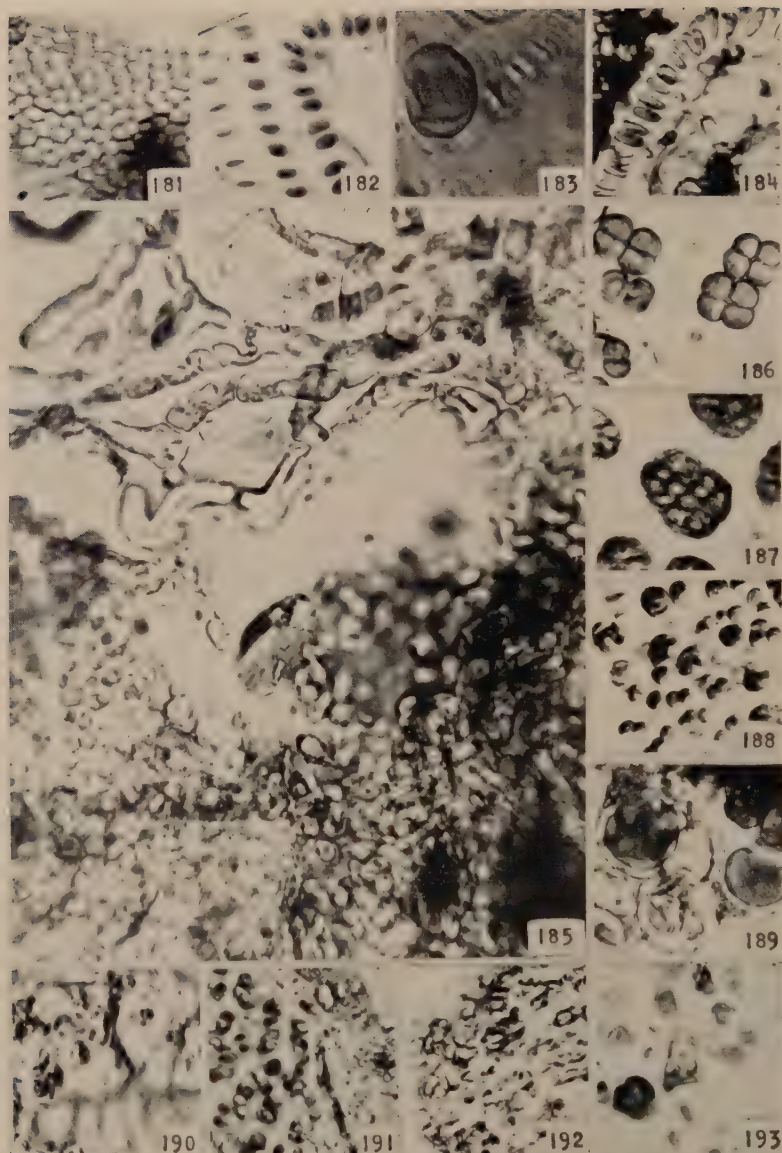


179

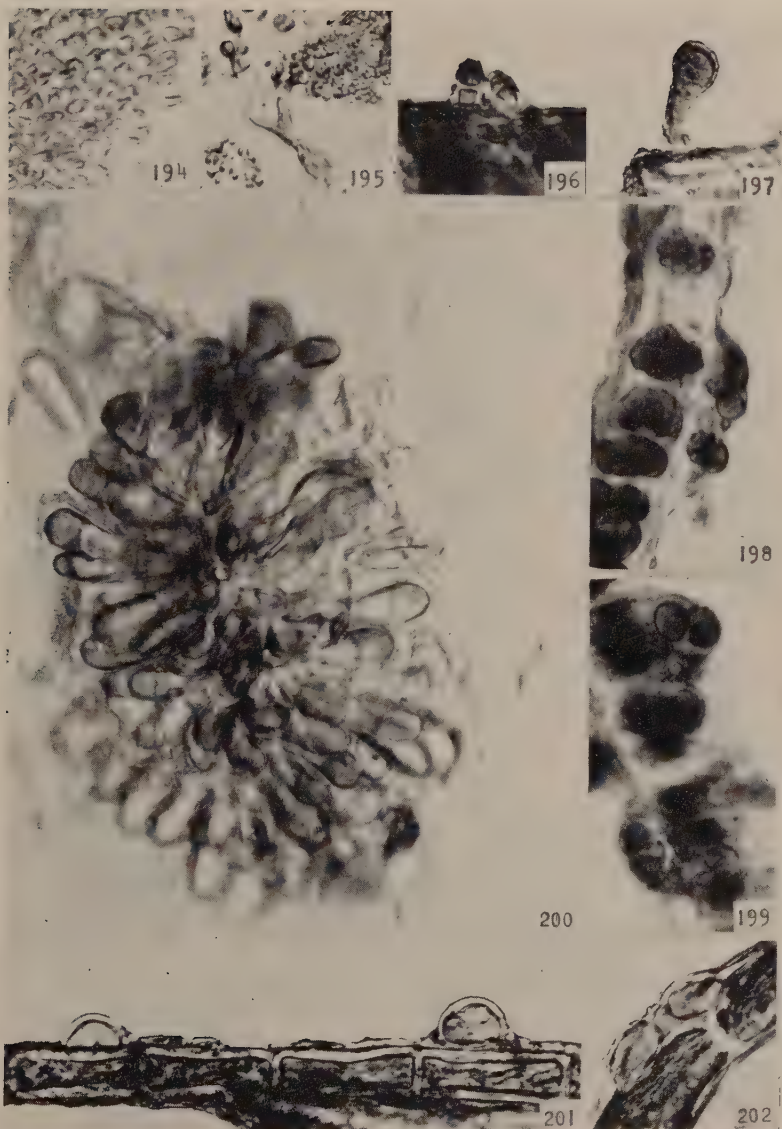


180

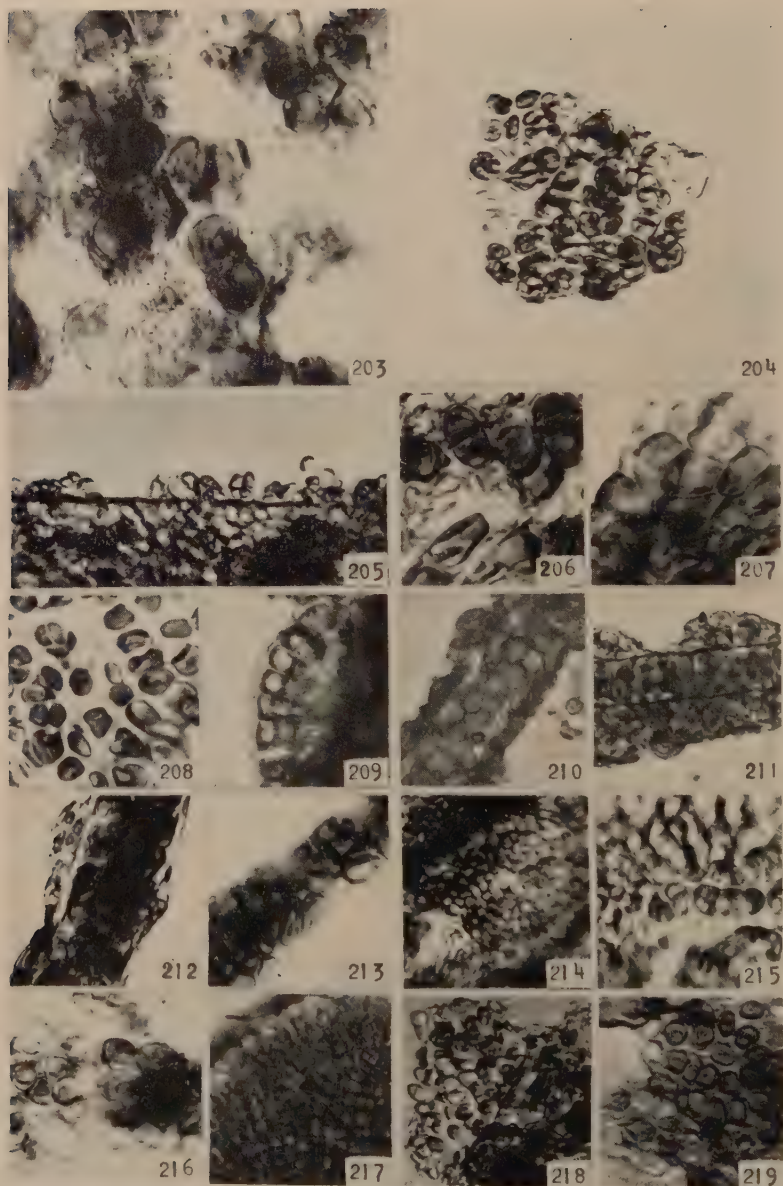
Figs. 175-180.—175. *Coelosphaerium kuetzingianum* Nägeli, from Nägeli notes, Zürich. 176. *Coelosphaerium Collinsii* Drouet & Daily, Type, D. 177. *Gomphosphaeria lusca* Skuja, Topotype, D. 178. *Gomphosphaeria aponina* var. *cordiformis* Wolle, Type, FC. 179. *Gomphosphaeria aponina* Kützing, Type, L. 180. *Gomphosphaeria cordiformis* var. *olivacea* Hansgirg, Isotype, FC.



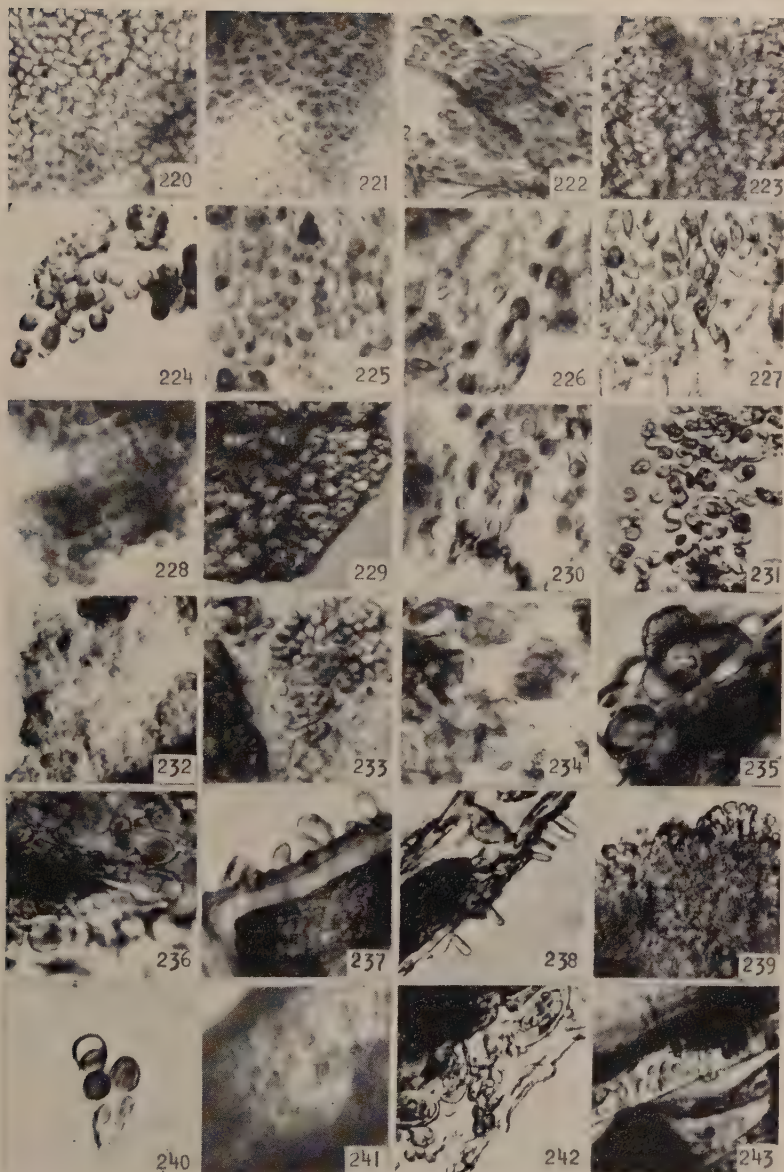
Figs. 181-193.—181. *Merismopodia geminata* Lagerheim, Paratype, L. and *Microcrocis Dieteli* Richter, Type, L. 182. *Hormospora pellucida* Dickie, Type, BM. 183. *Nodularia* ? *fusca* W. R. Taylor, Type, TA. 184. *Cyanothrix primaria* Gardner, Type, NY. 185. *Hyella Balanii* Lehmann, Topotype, NY. 186. *Protococcus crepidinum* Thuret, Type, PC. 187. *Entophysalis granulosa* Kützing, Type, L. 188. *Pleurocapsa fluvialis* var. *subsalsa* Hansgirg, Isotype, FC. 189. *Pleurocapsa fuliginosa* Hauck, Type, L. 190. *Palmella oceanica* Crouan, Type, PC. 191. *Coccochloris densa* Meneghini, Type, FI. 192. *Xenococcus concharum* Hansgirg, Isotype, FC. 193. *Palmella mediterranea* Kützing, Type, L.



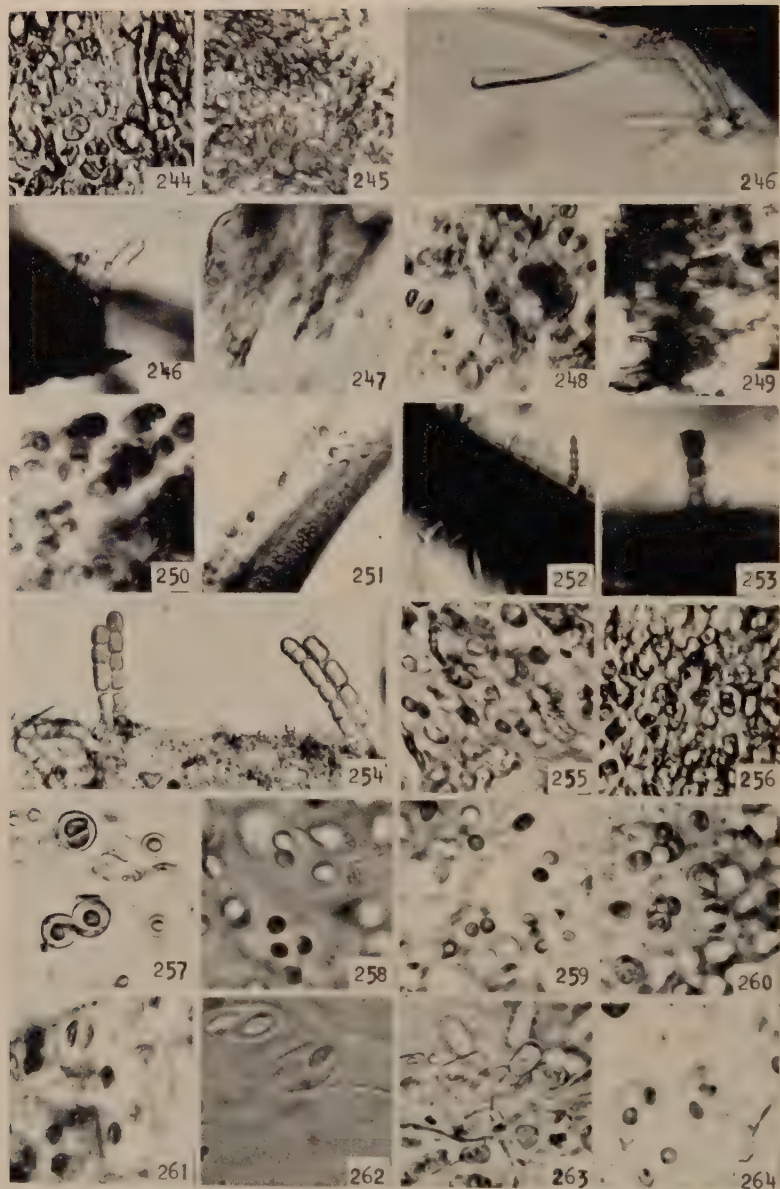
Figs. 194-202.—194. *Chroococcus atrochalybeus* Hansgirg, Isotype, FC. 195. *Chlorogloea lutea* Setchell & Gardner, Type, UC. 196. *Chamaesiphon roseus* var. *major* Hansgirg, Isotype, FC. 197. *Dermocarpa solitaria* Collins & Hervey, Type, NY. 198. *Dermocarpa Enteromorphae* Anand, Type, in coll. of F.E. Fritsch. 199. *Xenococcus violaceus* Anand, Type, in coll. of F.E. Fritsch. 200. *Dermocarpa protea* Setchell & Gardner, Type, UC. 201. *Dermocarpa hemisphaerica* Setchell & Gardner, Paratype, FC. 202. *Xenococcus pulcher* Hollenberg, Type, in herb. of G. J. Hollenberg.



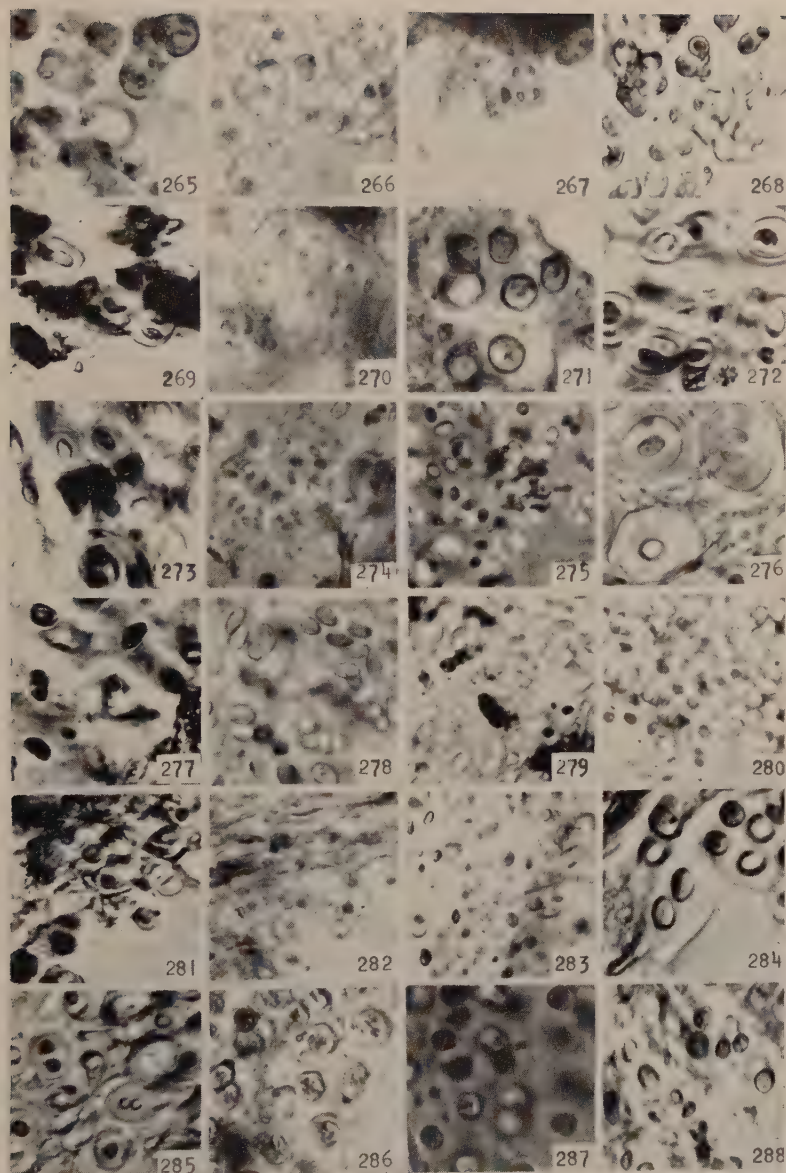
Figs. 203-219.—203. *Dermocarpa sublitoralis* Lindstedt, Isotype, D. 204. *Radaisia Laminariae* Setchell & Gardner, Type, UC. 205. *Pleurocapsa epiphytica* Gardner, Type, UC. 206. *Hyella linearis* Setchell & Gardner, Type, UC. 207. *Dermocarpa pacifica* Setchell & Gardner, Type, UC. 208, 209. *Oncobyrsa adriatica* Hauck, Type, L. 210. *Xenococcus Schousboei* Thuret, Type, PC. 211. *Palmella conferta* Kützing, Type, L. 212. *Xenococcus acervatus* Setchell & Gardner, Type, UC. 213. *Xenococcus Chaetomorphae* Setchell & Gardner, Type, UC. 214. *Dermocarpa Vickersiae* Collins, Type, NY. 215. *Radaisia subimmersa* Setchell & Gardner, Type, UC. 216. *Chroococcus fuscoviolaceus* var. *cupreofuscus* Hansgirg, Isotype, FC. 217. *Hydrococcus rivularis* Kützing, Type, L. 218. *Entophysalis Cornuana* Sauvageau & *Dermocarpa Flabaultii* Sauvageau, Types, PC. 219. *Aphanocapsa anodontae* var. *major* Hansgirg, Isotype, FC.



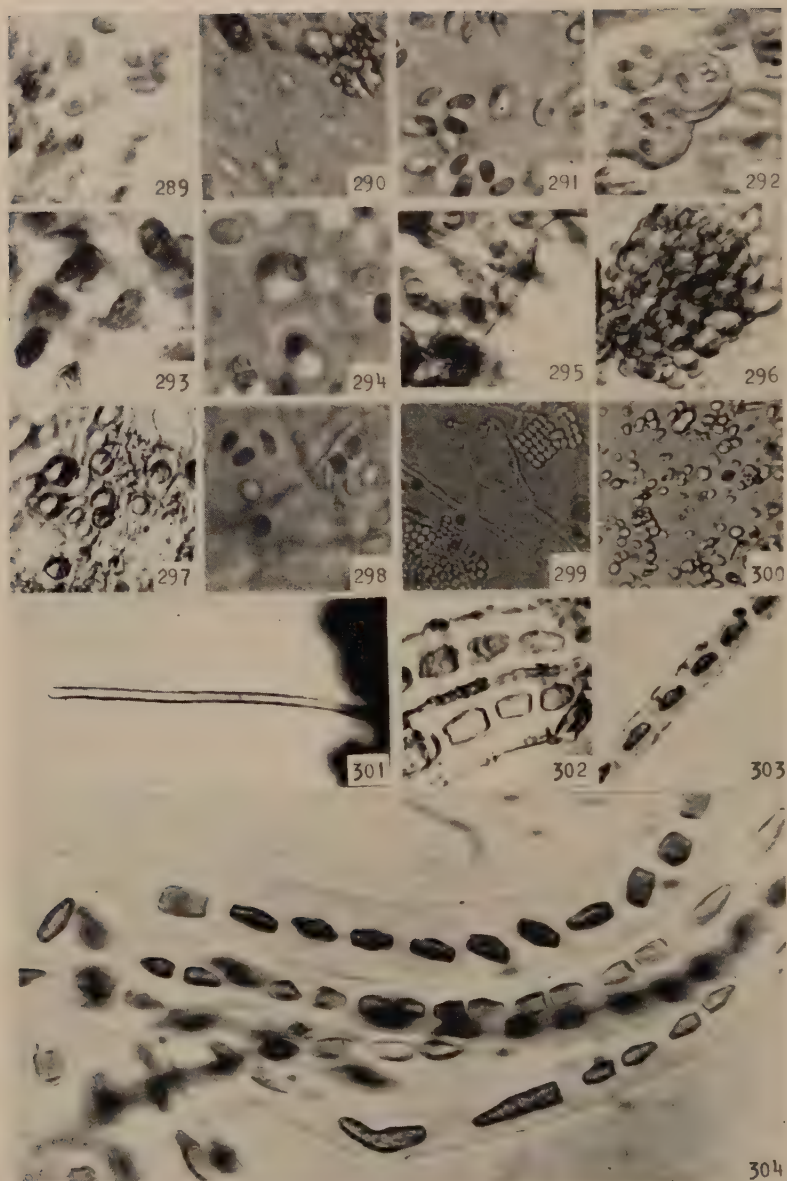
Figs. 220-243.—220. *Palmella duriuscula* Kützing, Type, L. 221. *Hydrococcus Gesatii* Rabenhorst, Type, D. 222. *Guyotia singularis* Schmidle, Type, ZT. 223. *Hydrococcus ulvaceus* Kützing, Type, L. 224. *Pleurocapsa minor* Hansgirg, Isotype, FC. 225. *Pleurococcus julianus* Meneghini, Type, FI. 226. *Chroococcus fuscoater* var. *fuscoviolaceus* Hansgirg, Isotype, FC. 227. *Coelosphaerium holopediforme* Schmidle, Type, ZT. 228. *Radaisia confluens* Gardner, Type, NY. 229. *Chroococcus* (*Rhodococcus*) *Hansgirgii* Schmidle, Type, ZT. 230. *Hyelococcus niger* Schmidle, Type, ZT. 231. *Cyanoderma rivulare* Hansgirg, Isotype, FC. 232. *Chroococcus minutissimus* Gardner, Type, NY. 233. *Entophysalis chlorophora* Gardner, Type, NY. 234. *Pleurococcus glomeratus* Meneghini, Type, FI. 235. *Dermocarpa Hollenbergii* Drouet, Type, D. 236. *Xenococcus Willii* Gardner, Type, NY. 237. *Dermocarpa chamaesiphonoides* Geitler, Isotype, FC. 238. *Chamaesiphon cylindricus* Boye Petersen, Type, in coll. of J. Boye Petersen. 239. *Nostoc Lemaniae* Agardh, Type, PC. 240. *Pleurocapsa fluvialis* Lagerheim, Type, DT. 241. *Xenococcus minimus* Geitler, Isotype, W. 242. *Xenococcus chroococcoides* Fritsch, Type, in coll. of F. E. Fritsch. 243. *Chamaesiphon portoricensis* Gardner, Type, NY.



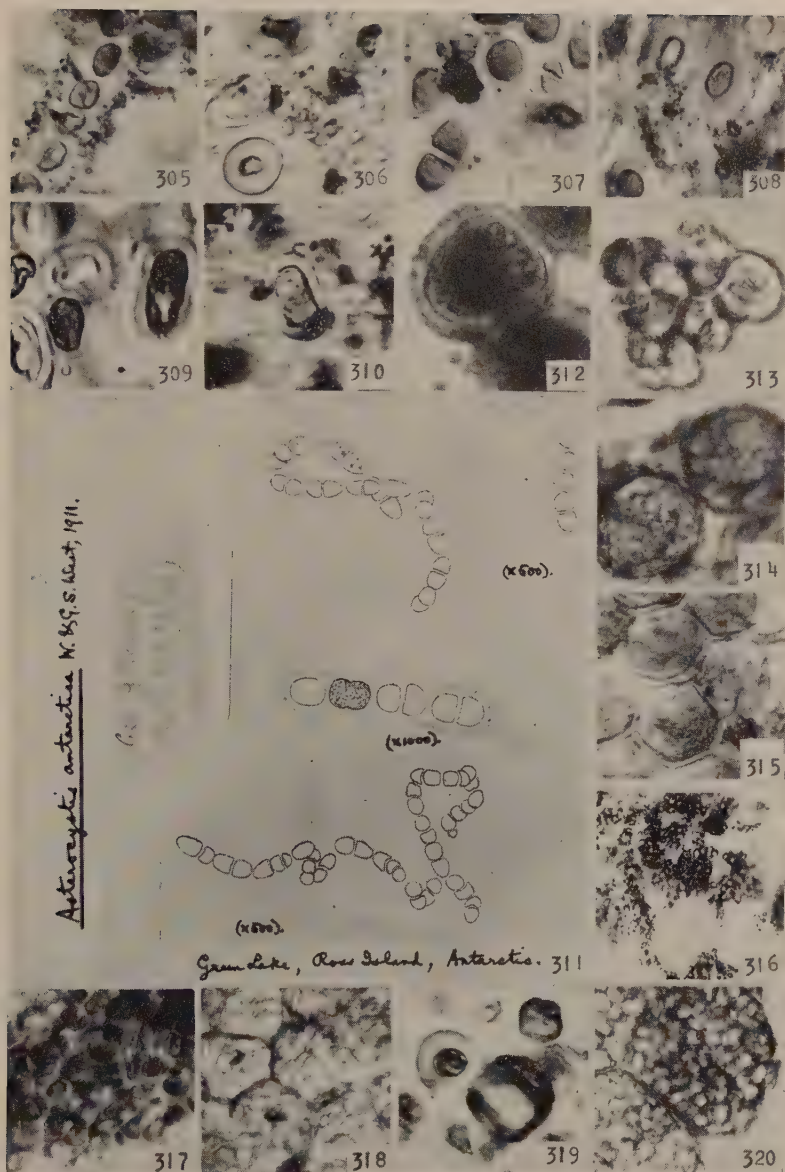
Figs. 244-264.—244. *Dermocarpa depressa* W. & G. S. West, Type, BM. 245. *Oncobyria Brebissonii* Meneghini, Type, L. 246. *Chamaesiphon gracilis* f. *elongatus* Wille, Type, S. 247. *Aphanocapsa concharum* Hansgirg, Isotype, FC. 248. *Aphanocapsa litoralis* Hansgirg, Isotype, FC. 249. *Chroococcus calcicola* Anand, Type, in coll. of F. E. Fritsch. 250. *Myrionema crustaceum* J. Agardh, Type, LD. 251, 252. *Clastidium setigerum* Kirchner, from coll. of K. Thomasson, Sweden, DA. 253. *Chamaesiphon sansibaricus* Hieronimus, Type, BM. 254. *Chamaesiphon filamentosus* Ghose, Type, in coll. of F. E. Fritsch. 255. *Gloeocapsa botryoides* Kützing, Type, L. 256. *Dactylothece Braunii* Lagerheim, Isotype, FC. 257. *Rhodococcus caldarium* Hansgirg, Isotype, FC. 258. *Gloeocapsa cryptococca* Kützing, Type, L. 259. *Gloeocapsa confluens* Kützing, Type, L. 260. *Gloeocapsa cartilaginea* Gardner, Type, NY. 261. *Gloeocapsa muralis* Kützing, Type, L. 262. *Gloeocapsa palea* β *minor* Kützing, Type, L. 263. *Gloeocapsa palea* Kützing, Type, L. 264. *Haematococcus Hookerianus* Berkeley & Hassall, Type, K.



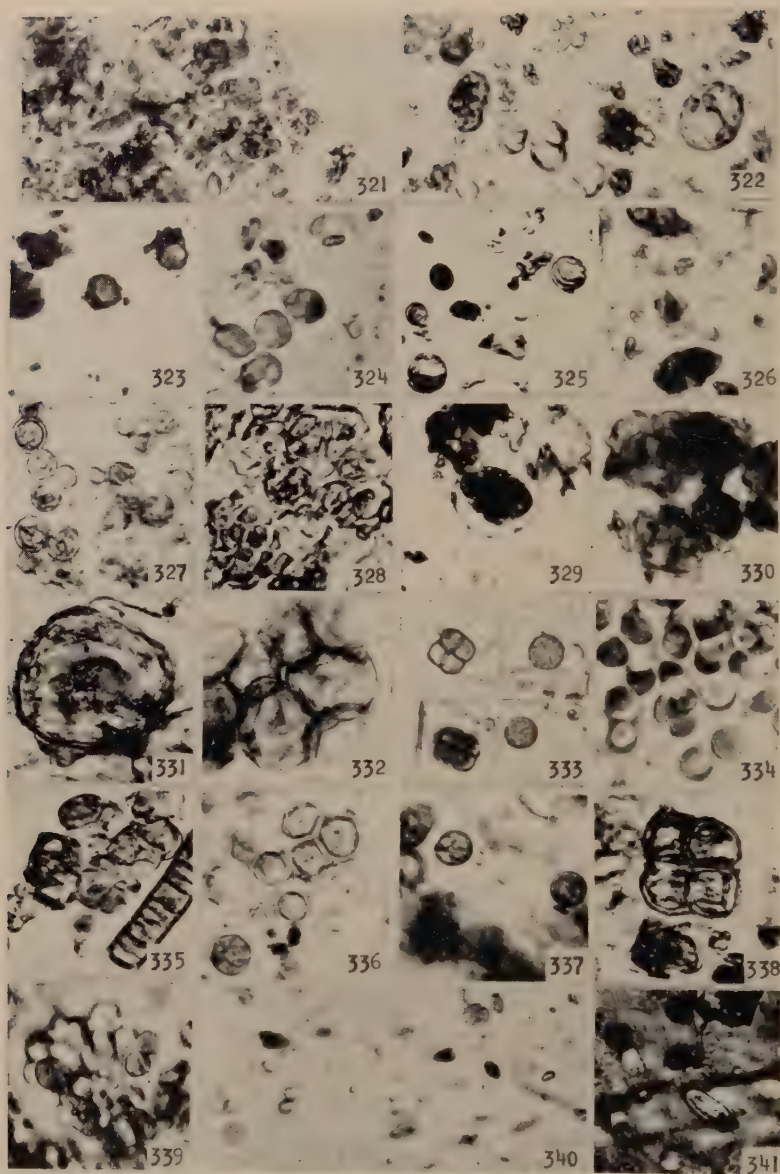
Figs. 265-288.—265. *Chrootheca cryptarum* Farlow, Type, FH. 266. *Gloeocapsa montana* Kützing, Type, L. 267. *Chroococcus constrictus* Gardner, Type, NY. 268. *Gloeocapsa sibogae* Weber-van Bosse, Type, L. 269. *Gloeocapsa salina* Roemer, Type, NY. 270. *Gloeocapsa sphaerica* Gardner, Type, NY. 271. *Gloeocystis riparia* A. Braun, Isotype, FC. 272. *Gloeotheca distans* Stizenberger, Isotype, FC. 273. *Palmella* (*Gloeocapsa*) *chrysophthalma* Montagne, Type, PC. 274. *Palmella Grevillei* Berkeley, Type, E. 275. *Gloeocapsa squamulosa* Brébisson, Type, L. 276. *Gloeocapsa polydermatica* Kützing, Type, L. 277. *Gloeocapsa palmelloides* Rabenhorst, Type, FC. 278. *Gloeocapsa quaternata* Kützing, Type, L. 279. *Palmella borealis* Kützing, Type, L. 280. *Palmella parietina* Nägeli, Type, L. 281. *Pleurococcus miniatus* var. *virescens* Hansgirg, Isotype, FC. 282. *Palmella Boettgeriana* Kützing, Type, L. 283. *Palmella sordida* Kützing, Type, L. 284. *Gloeocapsa nigra* var. *minor* Hansgirg, Isotype, FC. 285. *Botryococcus Braunii* var. *mucosus* Lagerheim, Isotype, FC. 286. *Palmella margaritacea* Kützing, Type, L. 287. *Palmella adriatica* Kützing, Type, L. 288. *Inoderma majus* Hansgirg, Isotype, FC.



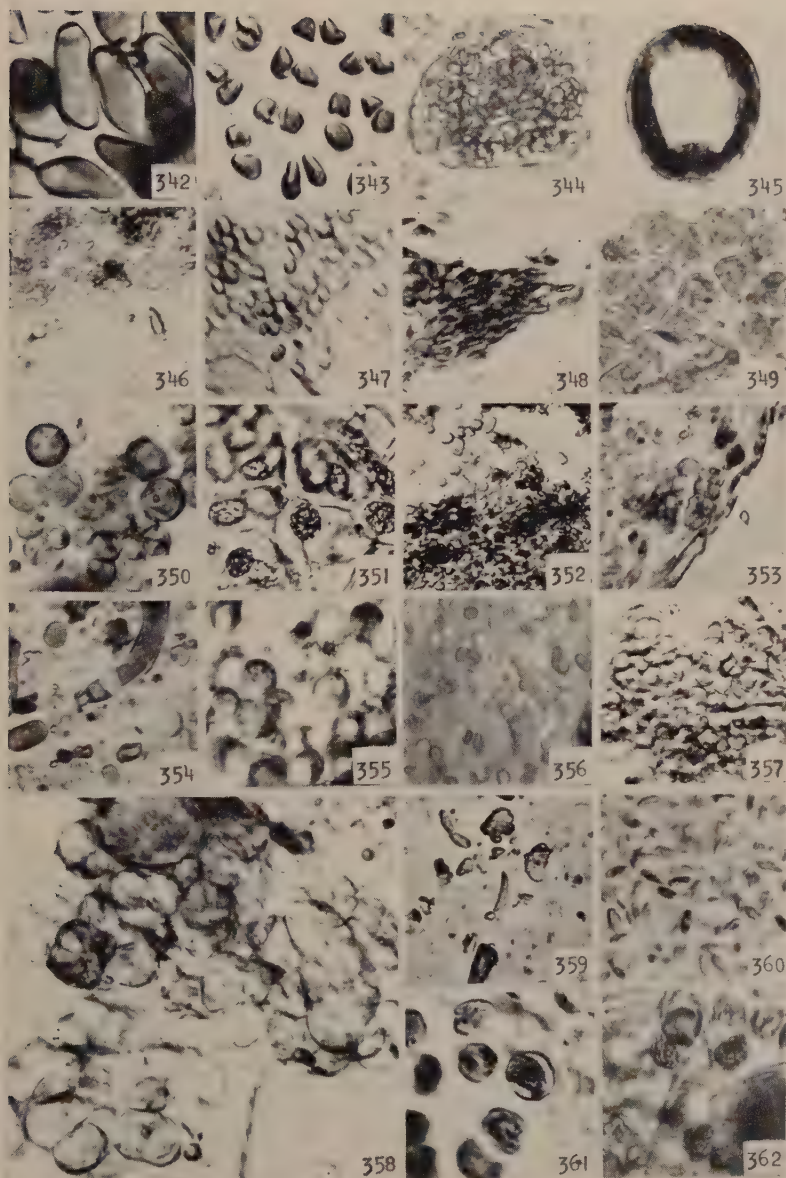
Figs. 289-304.—289. *Palmella crassa* Naccari, Type, PC. 290. *Bromicolla aleutica* Eichwald, Type, LD. 291. *Palmella laxa* Kützing, Type, L. 292. *Gloethece opalothecata* Gardner, Type, NY. 293. *Gloeocystis vesiculosa* var. *caldariorum* Hansgirg, Isotype, FC. 294. *Palmella rivularis* Carmichael, Type, K. 295. *Gloeocystis rupestris* var. *subaurantiaca* Hansgirg, Isotype, FC. 296. *Palmella littorea* Crouan, Type, PC. 297. *Gloeocapsa salina* Hansgirg, Isotype, FC. 298. *Palmella hyalina* β *musculicola* Carmichael, Type, K. 299. *Merismopodia violacea* Kützing, Type, L. 300. *Merismopodia Reitenbachii* Caspary, Type, L. 301. *Stichosiphon Hansgirgii* Geitler, Isotype, FC. 302. *Allogonium ramosum* var. *crassum* Hansgirg, Isotype, FC. 303. *Allogonium smaragdinum* var. *palustre* Hansgirg, Isotype, FC. 304. *Conferva ornata* Agardh, Type, S.



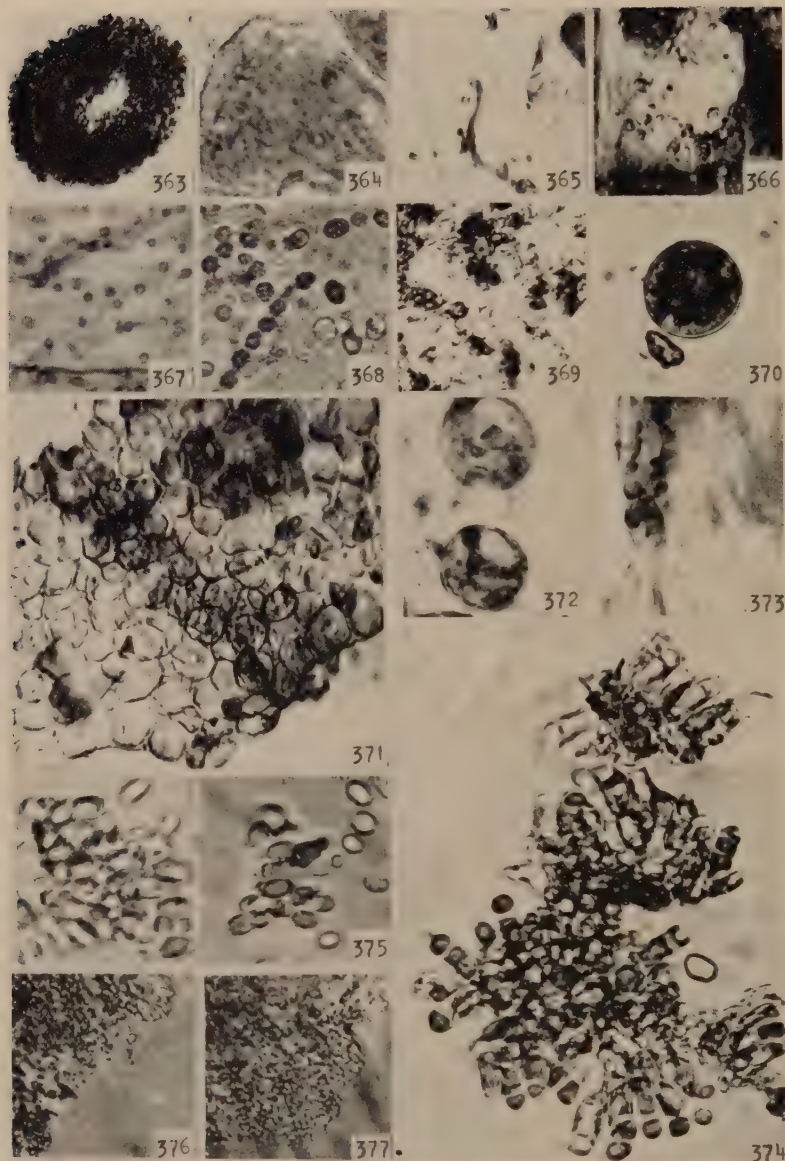
Figs. 305-320.—305. *Allogonium Wolleanum* var. *calcicola* Hansgirg, Isotype, FC. 306. *Chroothoece Richtersiana* Hansgirg, Type, FC. 307. *Chroodactylon Wolleanum* Hansgirg, Isotype, FC. 308. *Gloeocapsa dubia* Wartmann, Type, FC. 309. *Chroothoece Richtersiana* var. *aquatica* Hansgirg, Isotype, FC. 310. *Allogonium halophyllum* Hansgirg, Isotype, FC. 311. *Asterocystis antarctica* W. & G. S. West, from West notes, BM. 312. *Microbaloa major* Kützing, Type, L. 313. *Microbaloa botryoides* Kützing, Type, L. 314. *Microbaloa aurantiaca* Kützing, Type, L. 315. *Microbaloa pallida* Kützing, Type, L. 316. *Microcystis minuta* var. *violacea* Lindstedt, Type, in coll. of A. Lindstedt. 317. *Microcystis parvissima* Kützing, Type, L. 318. *Microcystis minor* Kützing, Type, L. 319. *Microcystis Brebissonii* Meneghini, Type, FI. 320. *Microcystis olivacea* Kützing, Type, L.



Figs. 321-341.—321. *Protococcus minor* β *mucosus* Kützing, Type, L. 322. *Protococcus variabilis* Hansgirg, Isotype, FC. 323. *Protococcus brunens* Kützing, Type, L. 324. *Protococcus minor* Kützing, Type, L. 325. *Protococcus caldarium* Magnus, Type, L. 326. *Protococcus lilacinus* Rabenhorst, Isotype, FC. 327. *Protococcus Chlamidomonas* Kützing, Type, L. 328. *Protococcus marinus* var. *virens* Hansgirg, Isotype, FC. 329. *Protococcus viridis* var. *insignis* Hansgirg, Isotype, FC. 330. *Protococcus chnauaticus* Kützing, Type, L. 331. *Protococcus botryoides* var. *nidulans* Hansgirg, Isotype, FC. 332. *Protococcus Felisii* Meneghini, Type, L. 333. *Protococcus globosus* Nägeli, Type, L. 334. *Protococcus crassus* Kützing, Type, L. 335. *Pleurococcus crenulatus* Hansgirg, Isotype, FC. 336. *Pleurococcus miniatus* var. *fuscens* Hansgirg, Isotype, FC. 337. *Pleurococcus miniatus* var. *roseolus* Hansgirg, Isotype, FC. 338. *Pleurococcus pachydermus* Lagerheim, Type, L. 339. *Pleurococcus vulgaris* f. *glomeratus* Hansgirg, Isotype, FC. 340. *Gloeotheca Baileyana* Schmidle, Type, ZT. 341. *Gloeotheca minor* Beck, Type, Charles University, Prague.



Figs. 342-362.—342. *Gloeocystis scopulorum* Hansgirg, Isotype, FC. 343. *Gloeocystis marina* Hansgirg, Isotype, FC. 344. *Limnodictyon Roemerianum* Kützing, Type, L. 345. *Chroococcus macrococcus* var. *salinarum* Hansgirg, Isotype, FC. 346. *Aphanocapsa albida* Zeller, Type, NY. 347. *Aphanocapsa rufescens* Hansgirg, Isotype, FC. 348. *Oncobrysa fluvialis* Agardh, Type, LD. 349. *Palmella flava* Kützing, Type, L. 350. *Gloeocapsa stillicidiorum* Kützing, Type, L. 351. *Gloeocapsa ampla* Kützing, Type, L. 352. *Polycystis violacea* Itzigsohn, Isotype, FC. 353. *Sarcina ventriculi* Goodsir, Type, L. 354. *Synechococcus intermedius* Gardner, Type, NY. 355. *Hyphelia aurantiaca* Libert, Type, BR. 356. *Palmella hormospora* Meneghini, Type, FI. 357. *Synechocystis aquatilis* Sauvageau, Isotype, FC. 358. *Xenococcus Schousboei* var. *pallidus* Hansgirg, Isotype, FC. 359. *Dactylococcopsis rhabdidioides* Hansgirg, Isotype, FC. 360. *Oncobrysa fluvialis* Agardh, Type, LD. 361. *Palmella aurantia* Agardh, Type, LD. 362. *Palmella parvula* Kützing, Type, L.



Figs. 363-377.—363. *Coelosphaerium Leloupii* Kufferath, Topotype, D. 364. *Palmogloea gigantea* Kützing, Type, L. 365. *Dactylococcopsis arcuata* Gardner, Type, NY. 366. *Chamaesiphon Rostafinskii* var. *minor* Hansgirg, Isotype, FC. 367. *Aphanothece clathrata* W. & G. S. West, Type, BIRM. 368. *Aphanothece piscinalis* Rabenhorst, Type, L. 369. *Aphanothece luteola* Schmidle, Type, ZT. 370. *Haematococcus suliginosus* Meneghini, Type, L. 371. *Aphanothece heterospora* Rabenhorst, Isotype, NY. 372. *Haematococcus Grevillei* Agardh, Type, K. 373. *Entophysalis zonata* Gardner, Type, FH. 374. *Chamaesiphon pseudo-polymorphus* Fritsch, Type, in coll. of F. E. Fritsch. 375. *Palmella papillosa* Kützing, Type, L. 376. *Aphanocapsa marina* Hansgirg, Isotype, FC. 377. *Aphanocapsa Lewisii* Keefe, Type, FH.

ADDITIONS AND CORRECTIONS

Page 14, line 5 from bottom, after "1907." insert: *S. crassus* var. *maximus* Lemmermann ex Forti, Syll. Myxophyc., p. 27. 1907.

Page 15, line 6 from bottom, after "TA)." insert: WASHINGTON: floating in open water, Falls lake, Lower Grand Coulee, Grant county, R. W. Castenholz 30, 30 Apr. 1955 (D, DA, FC, W).

Page 32, line 28 from bottom, after "1938." insert: *A. clatrata* f. *longior* Elenkin, *ibid.*, p. 149. 1938.

Page 44, line 26 from bottom, after "1929." insert: *Microcystis salina* Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 122, 139. 1938.

Page 45, line 5 from bottom, after "1868." insert: *Protococcus frustulosus* de Toni, Syll. Algar. 2: 704. 1889.

Page 46, line 2 from top, after "1845." insert: *Gloeocapsa livida* Kützing, Tab. Phyc. 1: 17. 1846.

Page 53, line 9 from bottom, for "*A. nebulosa*" read: *Aphanocapsa nebulosa*

Page 56, line 10 from top, for "*G. nigrescens*" read: *Gloeocapsa nigrescens*

Page 59, line 25 from bottom, for "*Gleditschia*" read: *Gleditsia*

Page 71, line 6 from top, after "1926." insert: *Gloeocapsa turgida* f. *maxima* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 212. 1938.

Page 71, line 16 from bottom, after "1932." insert: *Gloeocapsa turgida* f. *luteola* Hollerbach in Elenkin, Monogr. Algar. Cyanophyc., Pars Spec. 1: 212. 1938.

Page 83, line 20 from top, for "no. M4d" read: slide no. M4d.

Page 83, line 29 from bottom, for "*A. limnetica* f. *major*" read: *Anacystis limnetica* f. *major*

Page 86, line 5 from top, after "(FC)." insert: MICHIGAN: net collection from Fish lake, Orangeville, Barry county, F. K. & W. A. Daily 2770, 5 Sept. 1955 (D, DA).

Page 98, line 23 from top, after "1837." insert: *S. aponinum* Trevisan, Prosp. Fl. Eugani., p. 59. 1842.

Page 101, before line 26 from bottom, insert the new paragraph:

Phaeodermatium Hansgirg, Notarisia 4: 658. 1889. —Type species: *P. rivulare* Hansg.

Page 104, line 14 from bottom, after "1931." insert: *Ercegovicia litoralis* J. de Toni, Noter. Nomencl. Algol. 8. 1936.

Page 107, line 10 from top, after "shells," insert: Prospect, Halifax county

Page 120, before line 6 from top, insert the new paragraph:

Phaeodermatium rivulare Hansgirg, Notarisia 4: 658. 1889. —Type from near Cernosic, Bohemia (W).

Page 122, line 22 from bottom, before "Chotzen" insert: in einem Bächlein im oberen Theile des Solopisker-Thales nächst Cernosis, A. Hansgirg, Jun. 1885 (Type of *Phaeodermatium rivulare* Hansg., W; isotypes, D, FC);

Page 139, line 5 from top, after "1845." insert: *Coccochloris margaritacea* Meneghini *pro* *synon.* in Kürzing, *loc. cit.* 1845.

Page 141, before line 20 from bottom, insert the following paragraph:
Haematococcus minutissimus Hassall, Hist. Brit. Freshw. Alg. 1: 334. 1845. *Bichatia minutissima* Trevisan, Sagg. Monogr. Alg. Coccot., p. 65. 1848.

Page 145, line 22 from top, before "and *P. communis* β *Pleurococcus*" insert: *P. communis* α *leprarius*,

Page 145, line 31 from bottom, for "*B. flos-aquae*" read: *Byssus flos-aquae*

Page 146, before line 10 from top, insert the following paragraph:
Chlorella vulgaris Beijerinck, Bot. Zeitung 48: 726, 758. 1890. *Pleurococcus Beyerinckii* Artari, Bull. Soc. Imp. Nat. Moscou N. S. 6: 246. 1893. —The Type, E. G. Pringsheim culture no. 211/11i (DA) = *CHLORELLA VULGARIS* Beij.

Page 150, before line 25 from bottom, insert the following new paragraph:
Glaucocystis nostochinearum var. *minor* Hansgirg, Prodr. Algenfl. Böhmen 2: 140. 1892. —Type from Bohemia: Edmundsklamm, A. Hansgirg, Sept. 1890 (W) = spores of *ANABAENA* SP.

Page 153, line 14 from bottom, for "Spicil. f. Lips." read: Spicil. Fl. Lips.

Page 154, line 22 from top and line 32 from bottom, for "Trevisan" read: de Toni & Trevisan

Page 156, line 6 from top, after "1868." read: *Protococcus botryoides* Kirchner, Krypt. v. Schlesien 2(1): 103. 1878. *P. viridis* var. *botryoides* Wolle, Fresh-w. Alg. U. S., p. 182. 1887.

Page 156, lines 27 and 28 from top, delete: *CHROOCOCCACEAE* subfam. *EUCHROOCOCCACEAE* Hansgirg, Prodr. Algenfl. Böhmen 2: 129. 1892.

Page 156, line 28 from bottom, after "1865." insert: *Anacystis sparsa* Brébisson *pro* *synon.* in Rabenhorst, *loc. cit.* 1865.

Page 157, lines 19 and 20 from top, delete: *P. fusiformis* Rabenhorst, Deutschl. Krypt.-Fl. 2: 60. 1847.

Page 157, line 26 from bottom, after "1892." insert: *Aphanocapsa byalina* Hansgirg, *loc. cit.* 1892.

Page 161, line 3 from top, after "1907." insert: *M. ichthyoblabe* var. *violacea* Forti, *loc. cit.* 1907.

Page 161, line 7 from bottom, for "ex Drouet, Amer. Midl. Nat. 30: 672. 1943." read: Ann. New York Acad. Sci. 36: 72. 1936.

Page 163, line 8 from bottom, after "1868." insert: *P. minimus* var. *roseus* de Toni ex Dalla Torre & Sarnthein, Fl. Tirol 2: 47. 1901.

INDEX

- Achnanthes bijuga* Turp., 142
AGMENELLUM Bréb., 86
A. Prasiola Menegh., 87
A. quadrijugum (Turp.) Trevis., 142
A. QUADRUPLICATUM (Menegh.) Bréb., 86 (FIG. 133)
A. THERMALE (Kütz.) Dr. and Daily, 89 (FIG. 134—142)
A. tranquillum (Ehrenb.) Trevis., 87
A. violaceum Bréb., 154
Allogonium Kütz., 142
Allogonium sect. *Asterocytis* (Gobi) Hansg., 152
Allogonium subgen. *Asterocytis* (Gobi) Hansg., 152
Allogonium sect. *Chroodactylon* Hansg., 146
Allogonium subgen. *Chroodactylon* Hansg., 146
Allogonium coeruleum (Näg.) Hansg., 146
A. confervaceum Kütz., 142
A. confervaceum α *tergestinum* Kütz., 142
A. confervaceum β *Kochianum* Kütz., 142
A. halophilum Hansg., 142 (fig. 310)
A. halophilum var. *stagnale* Hansg., 142
A. Itzigsohnii (Reinsch) Hansg., 145
A. Kochianum Kütz., 142
A. ramosum (Thw.) Hansg., 153
A. ramosum var. *crassum* Hansg., 142 (fig. 302)
A. smaragdinum (Reinsch) Hansg., 145
A. smaragdinum b. *palustre* Hansg., 142 (fig. 303)
A. smaragdinum var. *palustre* Hansg., 142
A. tergestinum Kütz., 142
A. Wolleanum Hansg., 146
A. Wolleanum var. *calicicola* Hansg., 143 (fig. 305)
A. Wolleanum var. *simplex* Hansg., 143
Alternantia Schill., 143
A. Geidleri Schill., 143
A. quadriga Schill., 143
A. ramifera Schill., 143
A. serra Schill., 143
A. tabularis Schill., 143
Alternantiaceae Schill., 143
ANACYSTIS Menegh., 34
A. AERUGINOSA (Zanard.) Dr. & Daily, 76 (FIG. 108—113)
A. amplivesiculata Gardn., 50 (fig. 20)
A. anomala Gardn., 50
A. botryoides (L.) Menegh., 145
A. brunnea (A. Br.) Wolle, 47
A. compacta Gardn., 50 (fig. 25)
A. consociata Gardn., 50
A. CYANEA (Kütz.) Dr. & Daily, 36 (FIG. 1—11)
A. cylindracea Gardn., 18 (fig. 156)
A. DIMIDIATA (Kütz.) Dr. and Daily, 70 (FIG. 100—107)
A. distans Gardn., 50
A. elabens (Bréb.) Setch. & Gardn., 28
A. firma (Kütz.) Dr. and Daily, 66
A. furfuracea (Berk.) Menegh., 138
A. gigas (W. & G. S. West) Gardn., 49
A. glauca Wolle, 66 (fig. 93)
A. gloeocapsoides Gardn., 50 (fig. 44)
A. Grevillei (Berk.) Kütz., 138
A. hyalina Chu, 51
A. INCERTA (Lemm.) Dr. & Daily, 42 (FIG. 12—15)
A. irregularis Gardn., 50
A. limnetica (Lemm.) Dr. & Daily, 83
A. limnetica f. *major* (Lagerh.) Dr. & Daily, 83
A. magnifica Gardn., 50 (fig. 58)
A. marginata Menegh., 46 (fig. 19)
A. MARINA (Hansg.) Dr. & Daily, 44 (FIG. 376, 377)
A. microsphaeria Gardn., 50
A. minuta (Ag.) Menegh., 157
A. minutissima Gardn., 50 (fig. 73)
A. MONTANA (Lightf.) Dr. & Daily, 45 (FIG. 16—90A)
A. MONTANA f. *GELATINOSA* (Henn.) Dr. & Daily, 69 (FIG. 98, 99)
A. MONTANA f. *MINOR* (Wille) Dr. & Daily, 66 (FIG. 91—97)
A. nidulans (Richt.) Dr. & Daily, 44
A. nidulans Gardn., 50 (fig. 62)
A. nigropurpurea Gardn., 50 (fig. 75)
A. nigroviolacea Gardn., 50
A. paludosa Rabenh., 143
A. parasitica (Kütz.) Trevis., 155
A. Peniocystis (Kütz.) Dr. & Daily, 31
A. pulchra Gardn., 50 (fig. 63)
A. pulverea (Wood) Wolle, 67
A. purpurea Jao, 52
A. radiata Gardn., 50 (fig. 60)
A. radiata var. *major* Gardn., 50 (fig. 51, 56)
A. Reinboldii Richt., 48
A. Roesana (de Bary) Dr. & Daily, 69
A. rupestris (Lyngb.) Dr. & Daily, 16
A. rupestris var. *prasina* (A. Br.) Dr. & Daily, 17
A. sparsa Bréb., 192
A. THERMALIS (Menegh.) Dr. & Daily, 77 (FIG. 114—129)
A. THERMALIS f. *MAJOR* (Lagerh.) Dr. & Daily, 83 (FIG. 130—132)
A. trochiscioides Jao, 52
A. Willei Gardn., 50
Aphanocapsa Næg., 137
Aphanocapsa subgen. *Autaphanocapsa* Hansg., 143
Aphanocapsa subgen. *Porphyridium* Hansg., 167
Aphanocapsa aequalis (Næg.) Hansg., 157
A. albida Zell., 143 (fig. 346)
A. anodontae Hansg., 120
A. anodontae var. *major* Hansg., 120 (fig. 219)
A. arctica Wheld., 69
A. aurantia (Ag.) Rabenh., 156
A. benaresensis Bharadw., 29
A. biformis A. Br., 48 (fig. 30)
A. brunnea Næg., 47
A. Castagnei (Kütz.) Rabenh., 28
A. concharum Hansg., 103 (fig. 247)
A. constructrix Bremek., 120
A. crassa Ghose, 143
A. cruenta (Sm. & Sow.) Hansg., 167

- A. cruenta* b. *Wittrockii* (Richt.) Hansg., 161
A. cruenta var. *Wittrockii* (Richt.) Hansg., 161
A. delicatissima W. & G. S. West, 43 (fig. 15)
A. depressa (Berk.) Rabenh., 157
A. distans Zalesk., 122
A. elachista W. & G. S. West, 49
A. elachista var. *conferta* W. & G. S. West, 43
A. elachista var. *irregularis* Boye P., 67 (fig. 97)
A. elachista var. *planctonica* G. M. Sm., 67
A. endolithica Erceg., 122
A. endolithica var. *marina* Frémy, 105
A. endolithica var. *rivulorum* Geitl., 122
A. endolithica var. *violacescens* Erceg., 122
A. endophytica G. M. Sm., 67
A. Farlowiana Dr. & Daily, 67 (fig. 92)
A. Feldmannii Frémy, 76 (fig. 113)
A. flava (Kütz.) Rabenh., 157
A. fonticola Hansg., 49
A. fuscolutea Hansg., 49
A. Grevillei (Berk.) Rabenh., 138
A. Grevillei f. *densa* Ström, 52
A. Grevillei var. *microgranula* West, 67
A. Howei Coll., 76 (fig. 109)
A. hyalina (Lyngb.) Hansg., 192
A. intertexta Gardn., 50 (fig. 32)
A. Koordersii Ström, 67
A. Le-Jolisii (Thur.) Frémy, 139
A. Lewisii Keefe, 44 (fig. 377)
A. litoralis Hansg., 103 (fig. 248)
A. litoralis var. *macrococca* Hansg., 103
A. litoralis var. *natans* Wille, 104
A. marina Hansg., 44 (fig. 376)
A. membranacea Rabenh., 143
A. minima Mig., 43 (fig. 14)
A. montana Cram., 48
A. montana a. *macrococca* Cram., 48
A. montana var. *macrococca* Cram., 48
A. montana b. *micrococca* Cram., 48
A. montana f. *micrococca* Cram., 48
A. montana var. *micrococca* Cram., 48
A. muscicola (Menegh.) Wille, 46
A. Naegelii Richt., 48
A. nebulosa A. Br., 48 (fig. 69)
A. nivalis Lagerh., 49
A. pallida var. *micrococca* Brügg., 18
A. paludosa Rabenh., 143
A. parietina Näg., 139
A. pulchra (Kütz.) Rabenh., 28
A. Raspaigellae (Hauck) Frémy, 76
A. Richteriana Hieron., 49
A. Richteriana var. *major* Gardn., 17
A. rivularis (Carm.) Rabenh., 138
A. rivularis f. *major* Petk., 18
A. Roberti-Lamii Frémy, 105
A. Roeseana de Bary, 69
A. rufescens Hansg., 143 (fig. 347)
A. salina Woronich., 44
A. salinarum Hansg., 78 (fig. 118)
A. sesciacensis Frémy, 76 (fig. 111)
A. sideroderma Naum., 67
A. siderosphaera Naum., 67
A. smaragdina (Hauck) Hansg., 76
A. testacea (A. Br.) Näg., 78
A. thermalis (Kütz.) Brügg., 89
A. thermalis var. *minor* Hansg., 49 (fig. 71)
A. violacea Grun., 48
A. violacea var. *minor* Hansg., 49
A. virescens (Hass.) Rabenh., 165
A. Wittrockii (Richt.) Hansg., 161
A. Zanardinii (Hauck) Hansg., 76
Aphanothece Näg., 13
Aphanothece sect. *Aphanothece* Näg., 13
Aphanothece subgen. *Aphanothece* (Näg.) Kirchn., 13
Aphanothece sect. *Coccochloris* Spreng., 13
Aphanothece subgen. *Coccochloris* (Spreng.) Kirchn., 13
Aphanothece *bacilloidea* Gardn., 32
A. bullosa (Kütz.) Rabenh., 16
A. bullosa var. *major* Geitl., 18
A. bullosa var. *minor* Geitl., 18
A. caldarium Richt., 48
A. caldarium var. *cavernarum* Hansg., 31
A. caldarium b. *muralis* (Tomasch.) Hansg., 32
A. caldarium var. *muralis* (Tomasch.) Hansg., 32
A. cancellata Zalesk., 29
A. Castagnei (Kütz.) Rabenh., 28
A. clathrata W. & G. S. West, 143 (fig. 367)
A. clathrata var. *brevis* Bachm., 32
A. clathrata f. *longior* (Naum.) Elenk., 191
A. clathrata var. *rosea* Skuja, 43 (fig. 12)
A. clathratiformis Szaf., 143
A. clathratiformis var. *major* Liebet., 143
A. coerulescens A. Br., 17
A. coerulescens (Borzi) Geitl., 29
A. conferta Richt., 49
A. conferta var. *brevis* Gardn., 17 (fig. 160)
A. conglomerata Rich, 28 (fig. 166)
A. cretaria Frémy, 52
A. curvata Lagerh., 28
A. elabens (Bréb.) Elenk., 28
A. Gardneri J. de Toni, 17
A. Geitleri J. de Toni, 29
A. gelatinosa Gardn., 17
A. gelatinosa (Henn.) Lemm., 69
A. glebulenta Zalesk., 29
A. globosa Elenk., 79
A. Goetzei Schmidle, 143
A. gracilis Schill., 143
A. halophytica Frémy, 28
A. heterospora Rabenh., 143 (fig. 371)
A. hyalina (Lyngb.) A. Br., 157
A. karukerae Lami, 29
A. Kuhlmannii Hieron., 29
A. laxa (Kütz.) Rabenh., 139
A. Lebrunii Duvign. & Sym., 28 (fig. 165)
A. Le-Jolisii Thur., 139
A. Lemnae Chu, 18
A. longior Naum., 32
A. luteola Schmidle, 143 (fig. 369)
A. margaritacea (Kütz.) Forti, 139
A. membranacea (Rabenh.) Born., 143
A. microscopica Näg., 18 (fig. 162)
A. microscopica var. *congesta* W. R. Taylor, 28
A. microscopica var. *granulosa* Gardn., 17 (fig. 151)
A. microspora (Menegh.) Rabenh., 16
A. minor Frémy, 28
A. minuta (Ag.) Mig., 157

APHANOTHECE

- A. Mooreana* (Harv.) Lagerh., 16
A. muralis (Tomasch.) Lemm., 32
A. Naegeli Wartm., 17 (fig. 147)
A. nidulans Richt., 44
A. nidulans var. *endophytica* W. & G. S. West, 143
A. nidulans var. *thermalis* Hansg., 144
A. nostocopsis Skuja, 29
A. opalescens Gardn., 50 (fig. 28)
A. Packardii (Farl.) Setch., 28
A. pallida (Kütz.) Rabenh., 16
A. pallida b. *micrococca* Brügg., 18
A. pallida var. *micrococca* Brügg., 18
A. pallida f. *minor* Dix., 18
A. parallela Szaf., 144
A. piscinalis Rabenh., 144 (fig. 368)
A. prasina A. Br., 17 (fig. 161)
A. prasina f. *minor* Wille, 18
A. Protohydrae Häyr., 44
A. pulverulenta Bachm., 44
A. purpurascens A. Br., 160
A. pyriformis (Benn.) Hansg., 146
A. rubra Liebet., 32
A. salina Elenk. & Danil., 29
A. salina f. *utahensis* (Tild.) Elenk., 28
A. saxicola Näg., 31
A. saxicola var. *aquatica* Witttr., 31 (fig. 170)
A. saxicola β *aquatica* f. *minor* Wille, 66
A. saxicola var. *clathratoides* Liebet., 32
A. saxicola f. *endophytica* (W. & G. S. West) Elenk., 143
A. saxicola f. *longior* (Naum.) Elenk., 32
A. saxicola f. *minor* Wille, 66
A. saxicola f. *minutissima* (West) Elenk., 42
A. saxicola f. *nidulans* (Richt.) Elenk., 44
A. saxicola f. *sphaerica* (W. & G. S. West) Elenk., 49
A. saxicola var. *sphaerica* W. & G. S. West, 49 (fig. 55)
A. saxicola f. *subachroa* (Hansg.) Elenk., 32
A. saxicola f. *thermalis* (Hansg.) Elenk., 144
A. saxicola var. *violacea* W. & G. S. West, 32
A. stagnina (Spreng.) A. Br., 15
A. stagnina var. *coerulescens* A. Br., 17
A. stagnina β *cuprina* Kütz., 16
A. stagnina f. *gelatinosa* Henn., 69
A. stagnina var. *nemathece* Frémy, 18
A. stagnina f. *piscinalis* (Rabenh.) Elenk., 144
A. stagnina f. *prasina* (A. Br.) Elenk., 17
A. stagnina var. *prasina* A. Br., 17 (fig. 161)
A. Stuhlmannii Hieron., 29
A. subachroa Hansg., 31 (fig. 172)
A. sulphurica Szaf., 144
A. Trentepohlii Grun., 66
A. tuberculosa (Aresch.) Forti, 48
A. uliginosa W. R. Taylor, 51
A. utahensis Tild., 28 (fig. 169)
A. viennensis Schill., 144
Aplococcus Roze, 35
A. natans Roze, 67
Arthrodesmus glaucescens Witttr., 144
A. glaucescens var. *papilliferus* Gutw., 144
Askenasya Möb., 102
A. polymorpha Möb., 121
Aspalatia Erceg., 102
A. andalousica Gonz., 105
A. crassa Erceg., 104
A. crassior Erceg., 104
A. tenuior Erceg., 104
Asterocapsa Chu, 137
A. gloeotheciformis Chu, 141
A. hyalina Chu, 51
A. trochiscioides (Jao) Chu, 52
Asterocytis Gobi, 152
A. africana G. S. West, 144
A. antarctica W. & G. S. West, 144 (fig. 311)
A. halophila (Hansg.) Forti, 142
A. halophila var. *stagnalis* Hansg., 142
A. Itzigsohnii (Reinsch) Forti, 145
A. ornata (Ag.) Hamel, 148
A. ramosa (Thw.) Gobi, 152
A. smaragdina (Reinsch) Forti, 145
A. smaragdina var. *palustris* Hansg., 142
A. Wolleana (Hansg.) Lagerh., 146
A. Wolleana var. *calicicola* Hansg., 143
Bacillus muralis Tomasch., 32
Baculalaria Borzi, 13
B. coerulescens Borzi, 29
B. thermalis Frémy, 144
Bangia foetida (Vill.) Spreng., 148
Batrachospermum Myosurus Ducluz., 144
Beckia bella Elenk., 92
Beckiaceae Elenk., 12
Beggiatoa roseo-persicina (Kütz.) Zopf, 163
Bichatia Turp., 144
B. adnata (L.) Trevis., 167
B. aeruginosa (Kütz.) Trevis., 46
B. alpicola (Lyngb.) Kuntze, 45
B. ambigua (Näg.) Kuntze, 47
B. ampla (Kütz.) Trevis., 150
B. arenaria (Hass.) Trevis., 152
B. atra (Ach.) Trevis., 51
B. aurata (Stizenb.) Kuntze, 17
B. botryoides (Kütz.) Trevis., 138
B. Brebissonii (Menegh.) Trevis., 155
B. bulbosa (Kütz.) Trevis., 16
B. caldariorum (Rabenh.) Kuntze, 138
B. Carmichaelii Trevis., 46
B. chrysophthalma (Mont.) Kuntze, 139
B. compacta (Kütz.) Kuntze, 47
B. confluens (Kütz.) Trevis., 139
B. conglomerata (Kütz.) Trevis., 46
B. coracina (Kütz.) Trevis., 46
B. cryptococca (Kütz.) Trevis., 139
B. cryptococcoides (Kütz.) Trevis., 46
B. cystiphora Trevis., 16
B. dermochroa (Näg.) Kuntze, 119
B. deusta (Menegh.) Trevis., 103
B. didyma (Kütz.) Trevis., 46
B. dubia (Wartm.) Kuntze, 150
B. fenestralis (Kütz.) Trevis., 150
B. frustulosa (Harv.) Trevis., 45
B. fulva (Kütz.) Kuntze, 16
B. furfuracea (Berk.) Trevis., 138
B. fuscescens Lagerh., 47
B. fuscolutea (Näg.) Lagerh., 47
B. gelatinosa (Kütz.) Trevis., 16
B. geminata (Kütz.) Kuntze, 47
B. granosa (Berk.) Trevis., 138
B. grumosa (Carm.) Trevis., 138

BICHATIA

B. haematodes (Kütz.) Kuntze, 47
B. Hassallii Trevis., 141
B. ianthina (Näg.) Kuntze, 47
B. juliana (Menegh.) Kuntze, 119
B. Kalchbrenneri (Grun.) Kuntze, 48
B. Kuetzingiana (Näg.) Kuntze, 17
B. Kuetzingiana Trevis., 138
B. laxa (Kütz.) Trevis., 139
B. lignicola (Rabenh.) Kuntze, 47
B. livida (Carm.) Trevis., 46
B. mellea (Menegh.) Trevis., 155
B. microcosmus (Roem.) Trevis., 141
B. microphthalma (Kütz.) Kuntze, 139
B. microspora (Menegh.) Trevis., 16
B. minutissima (Hass.) Trevis., 192
B. monococca (Kütz.) Trevis., 150
B. montana (Kütz.) Trevis., 138
B. montana (Lightf.) Trevis., 45
B. muralis (Kütz.) Kuntze, 139
B. mucosa (Morr.) Trevis., 152
B. nigra (Menegh.) Trevis., 46
B. nigrescens (Näg.) Kuntze, 48
B. obscura (Hass.) Trevis., 141
B. ocellata (Rabenh.) Kuntze, 141
B. palea (Kütz.) Trevis., 138
B. paroliniana (Menegh.) Trevis., 16
B. Peniocystis (Kütz.) Kuntze, 31
B. polydermatica (Kütz.) Kuntze, 139
B. punctata (Näg.) Kuntze, 47
B. purpurea (Kütz.) Kuntze, 31
B. quaternata (Kütz.) Trevis., 139
B. Ralfsii (Harv.) Trevis., 46
B. rivularis (Carm.) Trevis., 138
B. romana (Mont.) Kuntze, 140
B. rosea (Kütz.) Trevis., 46
B. rubescens (Bréb.) Trevis., 158
B. rubicunda (Kütz.) Trevis., 46
B. rupestris (Kütz.) Kuntze, 47
B. rupestris (Lyngb.) Trevis., 16
B. rupicola (Kütz.) Kuntze, 16
B. salina (Roem.) Trevis., 138
B. sanguinea (Ag.) Trevis., 45
B. sanguinolenta (Kütz.) Trevis., 46
B. saxicola (Wartm.) Kuntze, 48
B. scopulorum (Näg.) Kuntze, 47
B. Shuttleworthiana (Kütz.) Trevis., 46
B. squamulosa (Bréb.) Kuntze, 139
B. stegophila (Itzigs.) Kuntze, 48
B. stereophysalis (Menegh.) Trevis., 155
B. stillicidiorum (Kütz.) Trevis., 151
B. tepidarium (A. Br.) Kuntze, 17
B. theriaca (Hass.) Trevis., 51
B. thermalis (Kütz.) Trevis., 16
B. Titiana (Grun.) Kuntze, 48
B. uvaeformis (Roem.) Trevis., 151
B. variabilis (Hass.) Trevis., 141
B. versicolor (Näg.) Kuntze, 47
B. vesiculosa Turp., 144
B. violascea (Corda) Kuntze, 51
Boanema Erceg., 144
B. scoparium Erceg., 144
Botrydina Bréb., 144
B. Grevillei (Berk.) Menegh., 138
B. uda (Kütz.) Menegh., 138

B. vulgaris (Grev.) Bréb., 145
Botrydiopsis Trevis., 145
B. furfuracea (Berk.) Trevis., 138
B. Grevillei (Berk.) Trevis., 138
B. uda (Kütz.) Trevis., 138
B. vulgaris (Grev.) Trevis., 145
Botryococcus granularum (L.) Grev., 167
Botryococcus Braunii var. *mucosus* Lagerh., 140 (fig. 285)
Brachtia Trevis., 137
B. crassa (Nacc.) Trevis., 138
B. globosa (Menegh.) Trevis., 147
B. mediterranea (Kütz.) Trevis., 103
B. theriaca (Hass.) Trevis., 51
Brachynema Erceg., 102
B. litorale Erceg., 104
Brachythrix A. Br., 101
B. confervicola A. Br., 127
Bromicolla Eichw., 137 (fig. 290)
B. aleutica Eichw., 138
Byssus L., 145
B. botryoides L., 145
B. flos-aquae L., 145
B. kermesina (Wrang.) Wahlenb., 153
B. lactea L., 145
B. rosea (Schreb.) Retz., 153
B. viridis Lam., 145
Cagniardia Trevis., 34
C. adriatica (Kütz.) Trevis., 139
C. aurantia (Ag.) Trevis., 156
C. borealis (Kütz.) Trevis., 139
C. botryoides (L.) Trevis., 145
C. Botteriana (Kütz.) Trevis., 139
C. Brebissonii Trevis., 158
C. bulbosa (Kütz.) Trevis., 16
C. Castagnei (Kütz.) Trevis., 28
C. conferta (Kütz.) Trevis., 111
C. cyanea (Kütz.) Trevis., 36
C. duriuscula (Kütz.) Trevis., 119
C. flava (Kütz.) Trevis., 157
C. fluvialis (Ag.) Trevis., 156
C. fontana (Kütz.) Trevis., 153
C. fusiformis (Roem.) Trevis., 157
C. hormospora (Menegh.) Trevis., 157
C. Kuetzingiana Trevis., 157
C. lamellosa (Kütz.) Trevis., 153
C. margaritacea (Kütz.) Trevis., 139
C. minuta (Ag.) Trevis., 157
C. pallida (Kütz.) Trevis., 16
C. papillosa (Kütz.) Trevis., 126
C. parvula (Kütz.) Trevis., 157
C. uvaeformis (Kütz.) Trevis., 158
C. virescens (Hass.) Trevis., 165
Calialoa Trevis., 154
C. Meneghinii Trevis., 154
Callonema Reinsch., 145
C. Itzigsohnii Reinsch., 145
C. smaragdinum Reinsch., 145
Catella Alv., 145
C. rubra Alv., 145
Chaerococcus hyalinus Kütz., 145
Chalarodora Pasch., 145
C. azurea Pasch., 145
Chamaesiphon A. Br. & Grun., 101
Chamaesiphon sect. *Brachythrix* A. Br., 101
Chamaesiphon sect. *Brachythrix* Geitl., 101

CHAMAESIPHON

- Chamaesiphon* subgen. *Brachythrix* A. Br., 101
Chamaesiphon sect. *Euchamaesiphon* Geitl., 101
Chamaesiphon sect. *Godlewskia* (Jancz.) Geitl., 101
Chamaesiphon sect. *Sphaerogonium* Rostaf., 101
Chamaesiphon subgen. *Sphaerogonium* (Rostaf.) Hansg., 101
Chamaesiphon africanus Schmidle, 129
C. africanus var. *minimus* (Schmidle) Lemm., 129
C. aggregatus (Jancz.) Geitl., 128
C. amethystinus (Rostaf.) Lemm., 129
C. carpaticus Starm., 129
C. clavatus Jao, 129
C. clavatus Setch. & Gardn., 113
C. confervicola A. Br., 127
C. confervicola var. *curvatus* (Nordst.) Borzi, 128
C. confervicola f. *elongatus* Rabenh., 127
C. confervicola var. *Schieder Mayeri* (Grun.) Borzi, 128
C. crenothrichoides Zopf, 145
C. curvatus Nordst., 128
C. curvatus f. *elongatus* Nordst., 128
C. curvatus var. *elongatus* Nordst., 128
C. curvatus f. *polysporinus* Schirsch., 134
C. curvatus var. *Turneri* Forti, 129
C. cylindricus Boye P., 128 (fig. 238)
C. cylindrosporus Skuja, 134
C. Duran-Mileri Gonz., 129
C. fallax Geitl., 121
C. ferrugineus Fritsch, 121
C. filamentosus Ghose, 135 (fig. 254)
C. fuscoviolaceus (Hansg.) Margal., 120
C. fuscus (Rostaf.) Hansg., 126
C. fuscus var. *aurantus* Hansg., 120
C. Geitleri H. Luth., 120
C. gracilis Rabenh., 145
C. gracilis f. *elongatus* Wille, 133 (fig. 246)
C. gracilis f. *major* Magn. & Wille, 145
C. hemisphaericus Lemm., 113
C. hyalinus Scherff., 146
C. incrustans Grun., 127
C. incrustans f. *asiaticus* Wille, 129
C. incrustans var. *elongatus* Starm., 129
C. incrustans var. *laxus* Reinsch, 129
C. incrustans f. *longissimus* Wille, 129
C. incrustans f. *minor* Möb., 128
C. macer Geitl., 134
C. marinus Wille & Rosenv., 146
C. minimus Schmidle, 129
C. minutus (Rostaf.) Lemm., 129
C. minutus var. *gracilior* Geitl., 128
C. minutus var. *major* Geitl., 128
C. mollis Geitl., 129
C. oncohyssoides Geitl., 129
C. polonicus (Rostaf.) Hansg., 121
C. polymorphus Geitl., 120
C. portoricensis Gardn., 128 (fig. 243)
C. pseudo-polymorphus Fritsch, 126 (fig. 374)
C. regularis Geitl., 126
C. roseus (Reinsch) Hansg., 111
C. roseus var. *major* Hansg., 111 (fig. 196)
C. Rostafinskii Hansg., 165
C. Rostafinskii var. *minor* Hansg., 146 (fig. 366)
C. sansibaricus Hieron., 135 (fig. 253)
C. Schieder Mayeri Grun., 128
C. Schieder Mayeri f. *subclavatus* Grun., 128
C. siderophilus Starm., 129
C. siderophilus var. *glabrus* B. Rao, 129
C. spagnicola Maill., 129
C. subglobosus (Rostaf.) Lemm., 121
C. subglobosus var. *major* Geitl., 128
C. torulosus Borzi, 129
C. Willei Gardn., 135
CHAMAESIPHONACEAE Borzi, 100
Chamaesiphonaceae subfam. *Cystogoneae* Hansg., 100
Chamaesiphonaceae subfam. *Euchamaesiphonaceae* Hansg., 100
Chamaesiphonopsis Fritsch, 101
C. regularis Fritsch, 126
Chaos Bory, 144
C. alpicola (Lyngb.) Bory, 45
C. bituminosus Bory, 137
C. hyalinus (Lyngb.) Bory, 157
C. primordialis Bory, 145
C. sanguinarius Bory, 146
Chlamidococcus *pluvialis* (Flot.) A. Br., 152
Chlamydomonas *nivalis* (Bauer) Wille, 167
Chlorella *caldaria* (Tild.) Allen, 161
C. infusionum (Schrank) Beij., 153
C. Koertltzii (Fritsch) Wille, 160
C. vulgaris Beij., 192
Chlorobium Nads., 146
C. limicola Nads., 146
Chlorococcum Fr., 144
C. Agardhii Menegh., 164
C. botryoides (L.) Fr., 145
C. botryoides (Kütz.) Rabenh., 156
C. coccoma (Kütz.) Rabenh., 162
C. crassum (Kütz.) Menegh., 162
C. frustulosum (Harv.) Rabenh., 45
C. gigas (Kütz.) Grun., 162
C. glomeratum (Ag.) Rabenh., 162
C. humicola (Näg.) Rabenh., 149
C. infusionum (Schrank) Menegh., 153
C. Meneghinii (Kütz.) Bréb., 153
C. Montagnei Menegh., 146
C. murale Grev., 164
C. murorum Grev., 164
C. Orsinii Menegh., 152
C. Orsinii f. *fimicola* Rabenh., 146
C. protogenitum (Kütz.) Rabenh., 154
C. umbrinum (Kütz.) Rabenh., 155
C. vulgare Grev., 145
C. Wimmeri (Hilse) Rabenh., 164
Chlorogloea Wille, 101
C. conferta (Kütz.) Setch. & Gardn., 111
C. endophytica Howe, 110
C. purpurea Geitl., 146
C. lutea Setch. & Gardn., 110 (fig. 195)
C. major Geitl., 121
C. microcystoides Geitl., 122
C. microcystoides f. *pallida* Skuja, 122
C. minor Geitl., 121
C. purpurea var. *minutissima* Geitl., 121
C. regularis Setch. & Gardn., 112
C. sarcinoides Troitzk., 121
C. sinensis Chu, 129
C. tuberculosa (Hansg.) Wille, 112

CHLOROGLOEACEAE

- Chlorogloeaceae Geitl., 100
 Chondrocystis Lemm., 102
 C. Bracei Howe, 49 (fig. 82)
 C. Schauinslandii Lemm., 104
 CHROOCOCCACEAE Näg., 11
 Chroococcaceae subfam. Chroocysteeae Hansg., 142
 Chroococcaceae I. Coccobactreeae Elenk., 11
 Chroococcaceae subfam. Euchroococcaceae Hansg., 11
 Chroococcaceae subfam. Euchroococcaceae trib. Coccineae Hansg., 11
 Chroococcaceae subfam. Euchroococcaceae trib. Phyllotheceinae Hansg., 11
 Chroococcaceae subfam. Euchroococcaceae Gruppe Thecineae Hansg., 156
 Chroococcaceae subfam. Euchroococcaceae trib. Thecineae Hansg., 147
 Chroococcaceae II. Gloeococceae-planimetreae Elenk., 11
 Chroococcaceae III. Gloeococceae-stereometreae B. Heterogloae Elenk., 11
 Chroococcaceae III. Gloeococceae-stereometreae B. Heterogloae 2. Tegumentocrassiores Elenk., 12
 Chroococcaceae III. Gloeococceae-stereometreae B. Heterogloae I. Tegumentotenuiores Elenk., 11
 Chroococcaceae III. Gloeococceae-stereometreae A. Homoeogloae 2. Excavatae Elenk., 11
 Chroococcaceae III. Gloeococceae-stereometreae A. Homoeogloae 2. Excavatae a) Distantes Elenk., 12
 Chroococcidiopsis Geitl., 35
 C. thermalis Geitl., 51
 Chroococcidium Geitl., 146
 C. gelatinosum Geitl., 146
 Chroococcopsis Geitl., 101
 C. amethystea (Rosenb.) Geitl., 112
 C. caldaria (Tild.) Geitl., 161
 C. fluminensis Fritsch, 121
 C. gigantea Geitl., 120
 Chroococcus Näg., 34
 Chroococcus subgen. Chlorogloea (Wille) Elenk., 101
 Chroococcus subgen. Chrysococcus Hansg., 162
 Chroococcus subgen. Eucapsis (Clem. & Shantz) Elenk., 35
 Chroococcus sect. Euchroococcus Hansg., 34
 Chroococcus subgen. Euchroococcus Hansg., 34
 Chroococcus subgen. Hydrococcus (Kütz.) Elenk., 101
 Chroococcus subgen. Rhodococcus Hansg., 137
 Chroococcus aeruginosus Gardn., 78
 C. aeruginosus Rabenh., 70
 C. alpinus Schmidle, 49
 C. atrochalybeus Hansg., 103 (fig. 194)
 C. atrovirens (Corda) Hansg., 141
 C. aurantiacus Bern., 52
 C. aurantiacus (Lib.) de Toni, 153
 C. aurantio-fuscus (Kütz.) Rabenh., 161
 C. aurantius (Ag.) Wille, 156
 C. aureo-viridis (Kütz.) Rabenh., 161
 C. aureus (Kütz.) Rabenh., 161
 C. bataviae van Oye, 79
 C. Bernardii van Oye, 71
 C. bituminosus (Bory) Hansg., 137
 C. bruneus (Kütz.) Rabenh., 162
 C. calcicola Anand, 104 (fig. 249)
 C. caldarium Hansg., 140
 C. chalybeus (Kütz.) Rabenh., 70
 C. chnaumaticus (Kütz.) Rabenh., 162
 C. cinnamomeus (Menegh.) Rabenh., 159
 C. coeruleus (Bréb.) Forti, 32
 C. cohaerens (Bréb.) Näg., 78 (fig. 78)
 C. cohaerens Näg., 48
 C. cohaerens var. antarcticus Wille, 52
 C. confervoides A. Br., 146
 C. consociatus Hariot, 18
 C. constrictus Gardn., 141 (fig. 267)
 C. crassus (Kütz.) Näg., 162
 C. crepidinum (Thur.) Hansg., 103
 C. cubicus Gardn., 50 (fig. 31)
 C. cumulatus Bachm., 79
 C. decolorans Mig., 49
 C. detorticans A. Br., 78 (fig. 128)
 C. Detonii Bern., 52
 C. dimidiatus (Kütz.) Näg., 70
 C. dispersus (Keissl.) Lemm., 83
 C. dispersus var. minor G. M. Sm., 67
 C. fuliginosus (Lenorm.) Rabenh., 152
 C. fuscus (Kütz.) Richt., 70
 C. fusco-ater (Kütz.) Rabenh., 46
 C. fusco-ater var. fuscoviolaceus Hansg., 120 (fig. 226)
 C. fuscoviolaceus Hansg., 120
 C. fuscoviolaceus var. cupreofuscus Hansg., 120 (fig. 216)
 C. giganteus West, 70
 C. giganteus var. occidentalis Gardn., 71 (fig. 106)
 C. glomeratus (Menegh.) Forti, 119
 C. Goetzei Schmidle, 121
 C. Gomontii Nyg., 83
 C. granulatus Zell., 140
 C. Hansgirgii Schmidle, 120 (fig. 229)
 C. heangloios Gardn., 78
 C. helveticus Näg., 78 (fig. 114)
 C. helveticus var. aurantiofuscus Hansg., 78 (fig. 122)
 C. helveticus var. aureo-fuscus Hansg., 78 (fig. 119)
 C. helveticus var. consociato-dispersus Elenk., 79
 C. helveticus f. major Lagerh., 83 (fig. 131, 132)
 C. Huberi J. de Toni, 52
 C. indicus Bern., 71
 C. indicus Zell., 36 (fig. 8)
 C. indicus var. epiphyticus Ghose, 71
 C. insignis Schmidle, 70 (fig. 101)
 C. irregularis Hub., 79
 C. julianus (Menegh.) Näg., 119
 C. kerguelensis Wille, 29
 C. lageniferus Hildebr., 146
 C. lilacinus Rabenh., 162
 C. limneticus Lemm., 83
 C. limneticus var. carneus (Chod.) Lemm., 83
 C. limneticus var. distans G. M. Sm., 83
 C. limneticus var. elegans G. M. Sm., 83
 C. limneticus var. fuscus Lemm., 83
 C. limneticus var. multicellularis Chu, 52

CHROOCOCCUS

- C. limneticus* var. *purpureus* (Snow) Tiff. & Ahlstr., 83
C. limneticus var. *subsalsus* Lemm., 83
C. lithophilus Erceg., 121
C. lithophilus f. *achromaticus* Erceg., 121
C. lithophilus f. *coloratus* Erceg., 121
C. lithophilus var. *rotae* Gonz., 79
C. luteolus Woronich., 71
C. macrococcus (Kütz.) Rabenh., 162
C. macrococcus var. *aquaticus* Hansg., 146
C. macrococcus f. *aureus* (Kütz.) Rabenh., 161
C. macrococcus var. *aureus* (Kütz.) Rabenh., 161
C. macrococcus var. *salinarum* Hansg., 146 (fig. 345)
C. macrococcus f. *stipitatus* Enwald, 146
C. mediocris Gardn., 78 (fig. 121)
C. membraninus (Menegh.) Näg., 77
C. membraninus var. *crassior* Hansg., 78 (fig. 126)
C. membraninus var. *salinus* Erceg., 104
C. microcystoideus W. & G. S. West, 141
C. minimus (Keissl.) Lemm., 96
C. minimus var. *crassus* B. Rao, 18
C. minimus var. *turfosus* Steinecke, 146
C. minor (Kütz.) Näg., 163
C. minor var. *dispersus* Keissl., 83
C. minor f. *glomeratus* Frémy, 52
C. minor f. *major* W. & G. S. West, 146
C. minor f. *minimus* W. & G. S. West, 49
C. minor f. *mucosus* (Kütz.) Rabenh., 163
C. minor var. *mucosus* Kütz., 163
C. minor f. *violaceus* Wille, 52
C. minutissimus Gardn., 120 (fig. 232)
C. minutus (Kütz.) Näg., 16
C. minutus var. *amethystaceus* Wille, 79
C. minutus var. *amethysteus* Wille, 79
C. minutus var. *carneus* Chod., 83
C. minutus var. *lacustris* Chod., 83
C. minutus var. *limneticus* (Lemm.) Hansg., 83
C. minutus var. *minimus* Keissl., 96
C. minutus var. *obliteratus* (Richt.) Hansg., 78
C. minutus var. *salinus* Hansg., 78
C. minutus var. *virescens* (Hantzsch) Hansg., 78
C. mipitanensis (Wolosz.) Geidl., 71
C. monetarum Reinsch, 146
C. montanus Hansg., 17 (fig. 150)
C. montanus var. *hyalinus* B. Rao, 18
C. multicoloratus Wood, 71
C. muralis Gardn., 50 (fig. 26)
C. Mutisii Gonz., 71
C. niger Starm., 52
C. obliteratus Richt., 78
C. Orsinii (Menegh.) Rabenh., 152
C. pallidus Näg., 78
C. parallelepipedon Schmidle, 67 (fig. 91)
C. polyedrififormis Schmidle, 78
C. Prescottii Dr. & Daily, 83 (fig. 130)
C. protogenitus (Bias.) Hansg., 154
C. purpureus Snow, 83
C. pyriformis Benn., 146
C. quaternarius Zalesk., 71
C. Raspagellae Hauck, 76 (fig. 112)
C. Rechingeri Wille, 52
C. refractus Wood, 51
C. Rochei Vir., 18
C. roseus (Menegh.) Wille, 163
C. rubiginosus (Suring.) Rabenh., 163
C. rubrapunctis Wolle, 121
C. rufescens (Kütz.) Näg., 78
C. rufescens f. *turicensis* Näg., 78
C. rufescens var. *turicensis* Näg., 78
C. sabulosus (Menegh.) Hansg., 164
C. sarcinoides Hub., 52
C. sarcinoides Wisl., 121
C. Scherffelianus Kol., 79
C. schizodermaticus West, 49
C. schizodermaticus var. *badio-purpureus* W. & G. S. West, 70 (fig. 103)
C. schizodermaticus var. *incoloratus* Geidl., 141
C. schizodermaticus var. *incoloratus* f. *paucistratosus* Geidl., 78
C. schizodermaticus f. *pallidus* Erceg., 121
C. siderochlamys Skuja, 146
C. Simmeri Schmidle, 141
C. smaragdinus Hauck, 76 (fig. 108)
C. solitarius Eichl., 71
C. sonorensis Dr. & Daily, 76
C. spelaeus Erceg., 71
C. spelaeus var. *aerugineus* Erceg., 71
C. spelaeus var. *violascens* Erceg., 71
C. splendidus Jao, 141
C. subsphaericus Gardn., 78 (fig. 117)
C. subtilissimus Skuja, 146
C. tenax (Kirchn.) Hieron., 70
C. tenax var. *boeticus* Gonz., 71
C. thermalis (Menegh.) Näg., 70
C. thermophilus Wood, 70
C. turgidus (Kütz.) Näg., 70
C. turgidus a. *chalybeus* (Kütz.) Rabenh., 70
C. turgidus var. *dimidiatus* (Kütz.) Bréb., 70
C. turgidus var. *fuscescens* (Kütz.) Forti, 70
C. turgidus var. *giganteus* (West) Cedergr., 70
C. turgidus var. *glomeratus* Hansg., 78 (fig. 120)
C. turgidus var. *Hookeri* Lagerh., 70 (fig. 102)
C. turgidus var. *japonicus* Bern., 71
C. turgidus f. *lamellosus* Beck-Mannag., 71
C. turgidus var. *maximus* Nyg., 71
C. turgidus f. *minor* Wille, 71
C. turgidus var. *mipitanensis* Wolosz., 71
C. turgidus f. *pallidus* Beck-Mannag., 71
C. turgidus var. *Pullei* Bern., 71
C. turgidus var. *rufescens* Wartm., 78
C. turgidus var. *solitarius* Ghose, 71
C. turgidus var. *submarinus* Hansg., 70 (fig. 104)
C. turgidus δ *subnudus* Hansg., 70
C. turgidus f. *subnudus* Hansg., 70
C. turgidus var. *subnudus* Hansg., 70
C. turgidus var. *subviolaceus* Wille, 128
C. turgidus β *tenax* Kirchn., 70
C. turgidus var. *tenax* Kirchn., 70
C. turgidus γ *thermalis* (Menegh.) Rabenh., 70
C. turgidus f. *thermalis* (Menegh.) Rabenh., 70
C. turgidus var. *thermalis* (Menegh.) Rabenh., 70
C. turgidus var. *uniformis* Gardn., 78
C. turgidus var. *violaceus* West, 71 (fig. 107)
C. turgidus var. *violaceus* f. *minor* Wille, 71
C. turicensis (Näg.) Hansg., 79
C. vacuolatus Skuja, 146
C. varius A. Br., 48
C. varius f. *atrovirens* A. Br., 49 (fig. 85)

CHROOCOCCUS

- C. varius* f. *fuscoluteus* A. Br., 48
C. varius var. *luteolus* Hansg., 49 (fig. 74)
C. varius f. *samoensis* Wille, 128
C. varius var. *samoensis* Wille, 128
C. verrucosus Krieg., 52
C. violaceus Rabenh., 48 (fig. 86)
C. virescens Hantzsch, 78 (fig. 116)
C. Westii Boye P., 71
C. Zopfii Hansg., 146
Chroodactylon Hansg., 146
C. ramosum (Thw.) Hansg., 153
C. Wolleanum Hansg., 146 (fig. 307)
Chroolepus coeruleum Näg., 146
Chroomonas Hansg., 147
C. Nordstedtii Hansg., 147
Chroostipes Pasch., 147
C. linearis Pasch., 147
Chroothece Hansg., 147
Chroothece sect. *Synechococcus* Näg., 13
Chroothece cryptarum Farl., 141 (fig. 265)
C. mobilis Pasch. & Petr., 147
C. monococca (Kütz.) Hansg., 151
C. monococca var. *mellea* (Menegh.) Kütz., 155
C. monococca b. *rupestris* Hansg., 147
C. monococca f. *rupestris* Hansg., 147
C. monococca var. *rupestris* Hansg., 147
C. Richteriana Hansg., 147 (fig. 306)
C. Richteriana var. *aquatica* Hansg., 147 (fig. 309)
C. Richteriana f. *marina* Hansg., 147
C. rupestris Hansg., 147
C. Willei Gardn., 147
CLASTIDIACEAE Dr. & Daily, 134
CLASTIDIUM Kirchn., 134
C. cylindricum Wheld., 147
C. rivulare Hansg., 147
C. SETIGERUM Kirchn., 135 (FIG. 251, 252)
C. setigerum var. *rivulare* Hansg., 147
Clathrochloris Geitl., 144
C. sulphurica (Szaf.) Geitl., 144
Clathrocystis Henfr., 34
C. aeruginosa (Kütz.) Henfr., 36
C. aeruginosa f. *major* (Wittr.) Keissl., 36
C. aeruginosa var. *major* Wittr., 36
C. elongata (W. & G. S. West) Forti, 42
C. holsatica Lemm., 42
C. holsatica var. *minor* Lemm., 147
C. insignis Beck, 36 (fig. 10)
C. montana Teod., 51
C. prasina (Wittr.) Woronich., 36
C. reticulata Lemm., 43
C. robusta Clark, 36 (fig. 11)
C. roseo-persicina (Kütz.) Cohn, 163
Closteriococcus Schmidle, 147
C. virnheimensis Schmidle, 147
Cluzella Bory 144
C. Myosurus (Ducluz.) Bory, 144
Coccobactraceae Elenk., 166
COCCOCHLORIS Spreng., 13
C. AERUGINOSA (Näg.) Dr. & Daily, 14 (FIG. 143, 144)
C. alpicola (Lyngb.) Spreng., 45
C. aurantia (Ag.) Wallr., 156
C. bullosa (Kütz.) Kuntze, 16
C. Castagnei (Kütz.) Dr. & Daily, 28
C. crassa (Nacc.) Menegh., 137
C. cruenta (Sm. & Sow.) Spreng., 167
C. cylindrica (Lyngb.) Bréb., 156
C. cystifera Hass., 16
C. depressa (Berk.) Menegh., 157
C. deusta Menegh., 103 (fig. 191)
C. ELABENS (Bréb.) Dr. & Daily, 28 (FIG. 164—169)
C. firma (Kütz.) Richt., 66
C. globosa (Ag.) Crouan, 157
C. globosa Menegh., 147
C. Grevillei (Berk.) Hass., 138
C. hyalina (Lyngb.) Trevis., 157
C. macrocarpa Bréb., 158
C. margaritacea Menegh., 192
C. mellea Bréb., 155
C. minuta (Ag.) Wallr., 157
C. Mooreana (Harv.) Hass., 16
C. muscicola Menegh., 46 (fig. 79)
C. muscorum Bréb., 138, 140
C. Myosurus (Ducluz.) Spreng., 144
C. nidulans (Richt.) Dr. & Daily, 44
C. nivalis (Bauer) Spreng., 167
C. obscura Hass., 141
C. Orsiniana Menegh., 147
C. parietina Menegh., 46 (fig. 77)
C. PENIOCYSTIS (Kütz.) Dr. & Daily, 31 (FIG. 170—172)
C. pila (Suh) Kütz., 158
C. piscinalis (Rabenh.) Richt., 144
C. protuberans (Sm. & Sow.) Spreng., 137
C. quaternata (Kütz.) Bréb., 139
C. radicata (Ag.) Spreng., 167
C. rivularis (Carm.) Hass., 138
C. rosea (Schreb.) Spreng., 153
C. rubescens Bréb., 158
C. rupestris (Lyngb.) Spreng., 15
C. Sczentzii Corda, 141
C. sordida (Kütz.) Menegh., 138
C. sparsa Bréb., 156
C. STAGNINA Spreng., 15 (fig. 154; FIG. 145—163)
C. stagnina β *cuprina* Kütz., 16
C. stagnina f. *gelatinosa* Henn., 69 (fig. 98)
C. stagnina b. *prasina* (A. Br.) Richt., 17
C. stagnina var. *prasina* A. Br., 17
C. stagnina f. *rupestris* (Lyngb.) Dr. & Daily, 16
C. terminalis (Ag.) Bréb., 158
C. thermalis Rabenh., 158
C. Trentepohlii (Grun.) Richt., 66
C. tuberculosa Aresch., 48
C. variabilis Hass., 141
C. vernicosa Bréb., 138
C. vesiculosa (Morr.) Menegh., 152
Coccoclea Palis., 144
C. viridis Palis., 147
Coccopedia Troitzk., 86
C. limnetica Troitzk., 87
C. turkestanica Kissel., 87
Cocophysium Link, 153
C. botryoides (L.) Link, 145
C. cobaltinum Link, 153
C. expallens Link, 147
C. nivale (Bauer) Link, 167

COCOTALES

- Coccotales trib. Hydrureae subtrib. Euhydrureae
Trevis., 148
- Coccotales trib. Protococceae subtrib. Haematococ-
ceae Trevis., 152
- Coelocystis Näg., 93
- C. Kuetzingiana Näg., 96
- Coelomoron Buell, 147
- C. regularis Buell, 147
- Coelosphaeriaceae Elenk., 12
- Coelosphaeriopsis Lemm., 35
- C. halophila Lemm., 76
- Coelosphaerium Näg., 93
- C. aerugineum Lemm., 97
- C. anomalum (Benn.) de Toni & Levi, 18
- C. anomalum var. aerugineum (Lemm.)
Hansg., 97
- C. anomalum var. minus Hansg., 49
- C. Collinsii Dr. & Daily, 96 (fig. 176)
- C. compositum Liebet., 147
- C. confertum W. & G. S. West, 147
- C. Dicksonii Arch., 147
- C. dubium Grun., 37
- C. dubium f. majus Thomass., 148
- C. Geitleri Schill., 97
- C. genuense (de Not.) Ard. & Straff., 94
- C. Goetzei Schmidle, 121
- C. halophilum (Lemm.) Geitl., 76
- C. holopediforme Schmidle, 120 (fig. 227)
- C. Kuetzingianum Näg., 96 (fig. 175)
- C. Kuetzingianum var. punctatum (Näg.)
Playf., 47
- C. lacustre (Chod.) Ostenf., 96
- C. Leloupii Kuff., 148 (fig. 363)
- C. limnicola Lund, 51 (fig. 76)
- C. minutissimum Lemm., 148
- C. minutissimum var. liliaceum Kuff., 148
- C. Naegelianum Ung., 96
- C. Naegelianum var. Lemmermannii Elenk. &
Hollerb., 94
- C. natans Lemm., 43
- C. pallidum Lemm., 148
- C. punctatum (Näg.) Playf., 47
- C. pusillum van Goor, 97
- C. radiatum G. M. Sm., 97
- C. reticulatum Lemm., 43
- C. roseum Snow, 97
- C. Wichurae Hilse, 94 (fig. 173)
- Cohnia Kunth, 163
- Cohnia Reichenb., 163
- Cohnia Wint., 163
- C. roseo-persicina (Kütz.) Wint., 163
- Coleonema arenifera Schousb., 111
- Conferva alpina Lyngb., 45
- C. foetida Vill., 148
- C. ornata Ag., 148 (fig. 304)
- C. rubens (Hoffm.) Sommerf., 154
- Corynephora granulosa Kütz., 103
- Cryptella Pasch., 148
- C. cyanophora Pasch., 148
- Cryptococceae Kütz. (as family), 148
- Cryptococcus Kütz., 148
- C. brunneus Kütz., 148
- C. carneus Kütz., 31
- C. coccineus Kütz., 148
- C. guttularis Robin, 148
- C. lobatus Roem., 148
- C. major Kütz., 148
- C. mollis Kütz., 148
- C. natans Kütz., 148
- C. nebulosus Kütz., 163
- C. roseus Kütz., 155
- C. sanguineus Kütz., 148
- C. vernicosus Kütz., 139
- Cyanarcus Pasch., 148
- C. hamiformis Pasch., 148
- Cyanidium Geitl., 161
- C. caldarium (Tild.) Geitl., 161
- Cyanocloster Kuff., 13
- C. muscicola Kuff., 32
- Cyanococcus pyrenogerus Hansg., 148
- Cyanocystis Borzi, 102
- Cyanocystis Rabenh., 150
- C. Itzigsohniana Rabenh., 150
- C. parva Contr., 129
- C. versicolor Borzi, 129
- Cyanoderma Weber-v. B., 159
- Cyanoderma subgen. Eucyanoderma Hansg., 159
- Cyanoderma subgen. Myxoderma Hansg., 101
- Cyanoderma Bradypodis Weber-v. B., 159
- C. Choleopodis Weber-v. B., 159
- C. rivulare Hansg., 120 (fig. 231)
- Cyanodermatium Geitl., 101
- C. gelatinosum Geitl., 121
- C. violaceum Geitl., 121
- Cyanodictyon Pasch., 148
- C. endophyticum Pasch., 148
- C. reticulatum (Lemm.) Geitl., 43
- Cyanophora Korsch., 148
- C. paradoxa Korsch., 148
- Cyanopteryche Pasch., 148
- C. Gloeocystis Pasch., 148
- Cyanostylon Geitl., 137
- C. banyolensis Margal., 18
- C. cylindrocellularis Geitl., 141
- C. microcystoides Geitl., 141
- C. sinensis Chu, 141
- Cyanotheca Pasch., 148
- C. longipes Pasch., 148
- Cyanothrix Gardn., 84
- Cyanothrix Schmidle, 84
- C. Cavanillesii Gonz., 85
- C. primaria Gardn., 85 (fig. 184)
- C. Willei Gardn., 85
- Cylindrocystis Menegh., 157
- C. Brebissonii Menegh., 157
- C. coerulescens Bréb., 32
- C. cylindrospora (Bréb.) Dr. & Daily, 157
- C. Le-Normandii Menegh., 149
- C. mellea (Menegh.) Bréb., 155
- C. rupestris (Kütz.) Dalla Torre & Sarnth., 167
- Cystococcus Näg., 149
- C. botryoides (Kütz.) Rabenh., 156
- C. humicola Näg., 149
- Dactylococcopsis Hansg., 149
- D. acicularis Lemm., 149
- D. acicularis var. grandis Frémy, 149
- D. africana G. S. West, 149
- D. alaskana Kol, 32
- D. antarctica Fritsch, 141
- D. arcuata Gardn., 149 (fig. 365)

DACTYLOCOCCOPSIS

- D. Echinii* Rosenv., 149
D. Elenkenii Roll, 32
D. ellipsoidea (Schröd.) Geitl., 32
D. fascicularis Lemm., 149
D. hirundiformis (G. S. West) Geitl., 156
D. inaequalis Nyg., 156
D. irregularis G. M. Sm., 149
D. libyca Marches., 149
D. montana W. & G. S. West, 140
D. mucicola Hust., 149
D. pectinarellophila West, 149
D. planctonica Teil., 32
D. raphidioides Hansg., 149 (fig. 359)
D. raphidioides f. falciformis Printz, 149
D. raphidioides f. longior Geitl., 156
D. raphidioides f. mucicola Frémy, 149
D. raphidioides var. solitaria Fjerd., 32
D. raphidioides f. subtoruosa Printz, 149
D. rupestris Hansg., 149
D. rupestris f. sigmoides Ley, 149
D. scenedesmoides Nyg., 32
D. Smithii R. & F. Chod., 32
D. Smithii var. sigmoidea R. & F. Chod., 32
Dactylococcus caudatus Hansg., 149
D. caudatus var. minor Hansg., 149
D. raphidioides Hansg., 149
D. sabulosus Hansg., 140
Dactylothece Lagerh., 137
D. Braunii Lagerh., 140 (fig. 256)
D. confluens (Kütz.) Hansg., 139
D. macrococca Hansg., 149
Dalmatella Erceg., 102
D. anomala Erceg., 105
D. buaensis Erceg., 104
D. litoralis Erceg., 105
D. polyformis Erceg., 104
D. violacea Erceg., 105
Dermocarpa Crouan, 101
D. aquae-dulcis (Reinsch) Geitl., 128
D. aquae-dulcis var. tatrensis Sturm., 129
D. biscayensis Sauvag., 112
D. caldaria (Tild.) Dr., 161
D. Cavanillesiana Gonz., 113
D. chamaesiphonoides Geitl., 128 (fig. 237)
D. clavata Geitl., 128
D. clavata var. aquae-dulcis Geitl., 128
D. cuspidata (Reinsch) Geitl., 111
D. depressa W. & G. S. West, 128 (fig. 244)
D. Enteromorphae Anand, 113 (fig. 198)
D. Farlowii Børges., 112
D. Flahaultii Sauvag., 120 (fig. 218)
D. fossae Fjerd., 149
D. fucicola Saund., 112
D. gaditana Gonz., 105
D. Gardneriana Dr., 121
D. hemisphaerica Setch. & Gardn., 112 (fig. 201)
D. Hollenbergii Dr., 129 (fig. 235)
D. incrassata (Lemm.) Geitl., 113
D. Kernerii Hansg., 128
D. Leibleiniae (Reinsch) Born., 111
D. Leibleiniae var. pelagica Wille, 113
D. Lemmermannii Geitl., 113
D. Marchantiae Setch. & Gardn., 113
D. minima Geitl., 113
D. minuta Dr., 129
D. olivacea (Reinsch) Tild., 111
D. olivacea var. gigantea B. Rao, 135
D. pacifica Setch. & Gardn., 112 (fig. 207)
D. parva (Conr.) Geitl., 129
D. Plectonematis Frémy, 129
D. prasina (Reinsch) Born., 111
D. prasina var. incrustans (Reinsch) Holmes & Batt., 111
D. protea Setch. & Gardn., 112 (fig. 200)
D. Reinschii Setch. & Gardn., 113
D. rosea (Reinsch) Batt., 111
D. rosea var. major Hansg., 111
D. Schousboei (Thur.) Born., 111
D. Setchellii Dr., 121
D. simulans Setch. & Gardn., 113
D. smaragdina (Reinsch) Tild., 111
D. Solheimii Dr., 129
D. solitaria Coll. & Herv., 112 (fig. 197)
D. solediformis (Reinsch) Geitl., 165
D. sphaerica Setch. & Gardn., 112
D. sphaerica var. galapagensis Setch. & Gardn., 104
D. sphaeroidea Setch. & Gardn., 112
D. sphagnicola (Maill.) Geitl., 129
D. strangulata Sauvag., 112
D. subltoralis Lindst., 113 (fig. 203)
D. suecica Kyl., 113
D. suffulta Setch. & Gardn., 112
D. versicolor (Borzi) Geitl., 129
D. versicolor var. subsalsa Proschk.-Lavr., 129
D. Vickersiae Coll., 112 (fig. 214)
D. violacea Crouan, 103
D. violacea var. rosea (Reinsch) Holmes & Batt., 111
D. xenococcoides Geitl., 128
Dermocarpaceae Geitl., 100
Dermocarpella Lemm., 102
D. hemisphaerica Lemm., 113
D. incrassata Lemm., 113
Desmazierella Gaill., 167
D. granulata (L.) Gaill., 167
Desmococcus Brand, 145
D. vulgaris (Grev.) Brand, 145
Diplocystis J. Ag., 34
Diplocystis (Dyplocystis) Berk. & Curt., 34
Diplocystis Cleve, 34
Diplocystis Trevis., 34
D. aeruginosa (Kütz.) Trevis., 36
D. elabens (Bréb.) Trevis., 28
D. ichthyoblabe (Kütz.) Trevis., 36
D. incerta (Lemm.) Dr. & Daily, 42
Disceraea A. & C. Morr., 150
D. purpurea A. & C. Morr., 150
Dzienia Woronich., 14
D. salina Woronich., 29
Embryosphaeria Trevis., 153
E. Meneghinii (Kütz.) Trevis., 153
Endonema Pasch., 150
E. gracile Pasch., 150
E. moniliforme Pasch., 150
Endonemataceae Pasch., 150
Endospira bryophila Bréb., 140
Endospora Gardn., 35
E. bicoccus Gardn., 50 (fig. 34)
E. mellea Gardn., 50 (fig. 29)

- E. nigra* Gardn., 50 (fig. 24)
E. olivacea Gardn., 50 (fig. 41)
E. rubra Gardn., 50 (fig. 57)
 Entophyalidaceae Geitl., 100
 ENTOPHYALIS Kütz., 101
E. atroviolacea Nov., 51 (fig. 18)
E. Brebissonii (Menegh.) Dr. & Daily, 127
E. chlorophora Gardn., 120 (fig. 233)
E. Collinsii J. de Toni, 104
E. CONFERTA (Kütz.) Dr. & Daily, 111
 (FIG. 196—215)
E. Cornuana Sauvag., 120 (fig. 218)
E. crustacea (J. Ag.) Dr. & Daily, 103
E. cryptarum (Farl.) Dr., 141
E. DEUSTA (Menegh.) Dr. & Daily, 103
 (FIG. 185—194, 247—250)
E. elongata (Wille) Dr. & Daily, 133
E. ENDOPHYTICA (Howe) Dr. & Daily, 110
 (FIG. 195)
E. granulosa Kütz., 103 (fig. 187)
E. LEMANIAE (Ag.) Dr. & Daily, 127
 (FIG. 221, 235—245)
E. LEMANIAE f. ELONGATA (Wille) Dr. &
 Daily, 133 (FIG. 246)
E. magnoliae Farl., 48
E. major Erceg., 104
E. marginalis Hollenb., 104
E. papillosa (Kütz.) Dr. & Daily, 126
E. Perrieri Frémy, 52
E. RIVULARIS (Kütz.) Dr., 119
 (FIG. 216—220, 222—234)
E. RIVULARIS f. PAPILLOSA (Kütz.) Dr. &
 Daily, 126 (FIG. 374, 375)
E. robusta Chu, 141
E. samoensis Wille, 120
E. sinensis Chu, 51
E. violacea Coll., 104
E. violacea Gardn., 51
E. violacea Weber-v. B., 103
E. Willei Gardn., 51
E. zonata Gardn., 150 (fig. 373)
Ephebe pubescens δ atra Flot., 46
E. pubescens d. cruenta Flot., 48
E. pubescens δ versicolor Flot., 45
Epilithia Erceg., 102
E. adriatica Erceg., 104
Ercegovicia J. de Toni, 102
E. litoralis (Erceg.) J. de Toni, 191
Ernstiella Chod., 150
E. rufa Chod., 150
Erythroconis Oerst., 150
E. littoralis Oerst., 150
Eucapsis Clem. & Shantz, 35
E. alpina Clem. & Shantz, 49
E. alpina var. minor Skuja, 52
E. alpina f. violacea Thomass., 36
E. minor (Skuja) Elenk., 52
E. minuta Fritsch, 150
E. salina Gonz., 90
Exococcus Näg., 101
E. ovatus Näg., 119
Geitleriella J. de Toni, 101
G. subimmersa (Setch. & Gardn.) J. de Toni, 112
Geminella scalariformis G. S. West, 85
G. scalariformis f. marina G. S. West, 85
Girodella foetida (Vill.) Gaill., 148
Glaucocystis Itzigs., 150
G. bullosa (Kütz.) Wille, 16
G. cingulata Bohl., 150
G. duplex Presc., 150
G. nostochinearum Itzigs., 150
G. nostochinearum var. gigas Gutw., 150
G. nostochinearum f. immanis Schmidle, 150
G. nostochinearum var. minor Hansg., 192
G. oocystiformis Presc., 150
Glaucanema Reinh., 152
G. ramosum (Thw.) Reinh., 152
Glaucosphaera Korsh., 150
G. vacuolata Korsh., 150
Globulina Turp., 144
G. atra (Ach.) Turp., 51
G. botryoides (L.) Turp., 145
G. lactea (L.) Turp., 145
G. rubens (Hoffm.) Turp., 153
G. sanguinea Turp., 167
Gloeocapsa Kütz., 34
Gloeocapsa subgen. *Bichatia* (Turp.) Forti, 144
Gloeocapsa subgen. *Chondrocystis* (Lemm.)
 Elenk., 102
Gloeocapsa sect. *Cyanocapsa* Kirchn., 35
Gloeocapsa subgen. *Cyanocapsa* Kirchn., 35
Gloeocapsa subgen. *Entophyalis* (Kütz.)
 Elenk., 101
Gloeocapsa sect. *Eugloeocapsa* Hansg., 34
Gloeocapsa subgen. *Eugloeocapsa* Hansg., 34
Gloeocapsa subgen. *Gloeotheca* (Näg.) Elenk., 13
Gloeocapsa sect. *Hyalocapsa* Kirchn., 34
Gloeocapsa subgen. *Placoma* (Schousb. & Thur.)
 Elenk., 101
Gloeocapsa subgen. *Rhabdoderma* (Schmidle &
 Lauterb.) Elenk., 13
Gloeocapsa sect. *Rhodocapsa* Näg., 13
Gloeocapsa sect. *Xanthocapsa* Näg., 13
Gloeocapsa *acervata* Gardn., 78
G. aeruginea Kütz., 46
G. aeruginosa Kütz., 46 (fig. 90)
G. aeruginosa f. lignicola (Wille), 49
G. alpicola (Lyngb.) Born., 45
G. alpina Näg., 48 (fig. 17)
G. alpina f. ambigua (Näg.) Hollerb., 47
G. alpina f. lignicola (Rabenh.) Hollerb., 47
G. alpina var. *mediterranea* Hansg., 49 (fig. 45)
G. alpina var. *polyedrica* Erceg., 52
G. alpina f. saxicola (Wartm.) Rabenh., 48
G. alpina var. *saxicola* (Wartm.) Rabenh., 48
G. alpina f. violacescens Erceg., 52
G. ambigua Näg., 47
G. ambigua a. fuscolutea Näg., 47
G. ambigua f. fuscolutea Näg., 47
G. ambigua b. pellucida Näg., 47
G. ambigua f. pellucida Näg., 47
G. ambigua var. *pellucida* Näg., 47
G. ambigua β rivularis Näg., 47
G. ambigua b. violacea Näg., 47
G. ambigua var. *violacea* Näg., 47
G. ampla Kütz., 150 (fig. 351)
G. arenaria (Hass.) Rabenh., 152
G. atrata Kütz., 46
G. atrovirens (Corda) Richt., 141
G. attingens Schill., 52

- G. aurata* Stizenb., 17
G. aurata b. *alpicola* Brügg., 18
G. aurata var. *alpicola* Brügg., 18
G. bahamensis Coll., 104
G. biformis Erceg., 52
G. biformis f. *dermochroa* Erceg., 52
G. biformis f. *punctata* Erceg., 52
G. bituminosa (Bory) Kütz., 137
G. botryoides Kütz., 138 (fig. 255)
G. Bracci (Howe) J. de Toni, 49
G. calcarea Tild., 78 (fig. 124)
G. calcicola Gardn., 50 (fig. 39)
G. caldarii Suring., 138
G. caldarium Rabenh., 138
G. cartilaginea Gardn., 141 (fig. 260)
G. cartilaginea var. *minor* Gardn., 32
G. chroococcoides Nov., 51 (fig. 54)
G. chrysophthalma Mont., 139 (fig. 273)
G. cohaerens (Bréb.) Hollerb., 78
G. compacta Kütz., 47 (fig. 49)
G. compacta var. *coeruleoatra* Nov., 51 (fig. 43)
G. confluens Kütz., 139 (fig. 259)
G. confluens β *palacea* Kütz., 139
G. conglomerata Kütz., 46 (fig. 81)
G. conspicua Reinsch, 150
G. coracina Kütz., 46
G. coracina β *placentaris* Kütz., 46
G. coracina var. *placentaris* Kütz., 46
G. Corrensii J. de Toni, 48
G. crepidinum Thur., 103
G. cryptococca Kütz., 139 (fig. 258)
G. cryptococcoides Kütz., 46
G. decorticans (A. Br.) Richt., 78
G. dermochroa Näg., 119
G. deusta (Menegh.) Kütz., 103
G. didyma Kütz., 46
G. dimidiata (Kütz.) Dr. & Daily, 70
G. dirumpens Beck-Mannag., 52
G. dubia Wartm., 150 (fig. 308)
G. Dvorakii Nov., 51 (fig. 59)
G. endocodia Vouk, 76
G. fenestralis Kütz., 150
G. flavo-aurantia Kütz., 140
G. fulva Kütz., 16
G. fuscescens Lagerh., 47
G. fuscolutea (Näg.) Kirchn., 47
G. fuscolutea Näg., 16
G. fuscolutea α *achroa* Kütz., 16
G. fuscolutea γ *hemichroa* Kütz., 17
G. fuscolutea β *holochroa* Kütz., 17
G. gelatinosa Kütz., 16 (fig. 163)
G. gelatinosa β *aeruginea* Kütz., 16
G. gelatinosa f. *cryptococcoides* (Kütz.) Rabenh., 46
G. gelatinosa var. *cryptococcoides* Kütz., 47
G. gelatinosa α *olivacea* Kütz., 16
G. geminata Kütz., 47 (fig. 33)
G. gigantea (West) Hollerb., 70
G. gigas W. & G. S. West, 49
G. gloeocapsoides (Setch. & Gardn.) Geidl., 104
G. glomerata Kütz., 46
G. Goepfertiana Hilse, 140
G. granosa (Berk.) Kütz., 138
G. haematodes Kütz., 47
G. haematodes var. *brunneola* Kirchn., 51
G. haematodes var. *violascens* Grun., 49 (fig. 70)
G. Holstii Hieron., 49
G. Hookeri Berk. & Hass., 139
G. ianthina Näg., 47 (fig. 23)
G. incrustata Chu, 51
G. insignis Thur., 140
G. Itzigsohnii Born., 48
G. juliana (Menegh.) Kütz., 119
G. Kalchbrenneri Grun., 48
G. Kuetzingiana Näg., 17 (fig. 159)
G. lacustris Hub., 52
G. lignicola Rabenh., 47
G. limnetica (Lemm.) Hollerb., 83
G. limnetica f. *distans* (G. M. Sm.) Hollerb., 83
G. limnetica f. *major* (Lagerh.) Dr. & Daily, 83
G. lithophila (Erceg.) Hollerb., 121
G. livida (Carm.) Kütz., 191
G. livida var. *minor* Gardn., 50 (fig. 52)
G. luteo-fusca Mart., 17
G. macrococca Hansg., 141
G. magma (Bréb.) Kütz., 46
G. magma f. *Itzigsohnii* (Born.) Hollerb., 48
G. magma var. *Itzigsohnii* (Born.) Hansg., 48
G. magma b. *opaca* Näg., 47
G. magma f. *opaca* (Näg.) Hollerb., 47
G. magma var. *opaca* (Näg.) Kirchn., 47
G. magma b. *pellucida* Näg., 47
G. magma var. *pellucida* Näg., 47
G. magma var. *Simmeri* (Schmidle) Nov., 141
G. mellea (Menegh.) Kütz., 155
G. membranina (Menegh.) Dr. & Daily, 77
G. microcosmus Roem., 141
G. microphthalma Kütz., 139
G. minima (Keissl.) Hollerb., 96
G. minima f. *Smithii* Hollerb., 67
G. minor (Kütz.) Hollerb., 163
G. minor f. *dispersa* (Keissl.) Hollerb., 83
G. minor f. *glomerata* Frémy, 52
G. minuta (Kütz.) Hollerb., 16
G. minuta f. *consociato-dispersa* (Elenk.) Hollerb., 79
G. minutula Gardn., 49
G. monococca Kütz., 150
G. monococca β *cohaerens* Kütz., 150
G. montana Kütz., 138 (fig. 266)
G. montana (Lightf.) Wille, 45
G. montana γ *caldarii* Suring., 138
G. montana f. *caldarii* Suring., 138
G. montana var. *caldarii* Suring., 138
G. montana f. *fenestralis* (Kütz.) Hollerb., 150
G. montana f. *flavo-aurantia* Kütz., 140
G. montana var. *flavo-aurantia* Kütz., 140
G. multispherica Gardn., 49 (fig. 21)
G. muralis Kütz., 139 (fig. 261)
G. nigra (Menegh.) Grun., 46
G. nigra var. *minor* Hansg., 140 (fig. 284)
G. nigrescens Näg., 48
G. nigrescens f. *vitrea* Nov., 51 (fig. 47)
G. ocellata Rabenh., 141
G. opaca Näg., 47
G. opaca β *pellucida* Kütz., 47
G. opaca var. *pellucida* Näg., 47
G. ovalis Gardn., 78 (fig. 115)
G. palea Kütz., 138 (fig. 263)
G. palea β *minor* Kütz., 139 (fig. 262)

GLOEOCAPSA

- G. palmelloides* Rabenh., 140 (fig. 277)
G. palustris Näg., 71
G. paroliniana (Menegh.) Bréb., 16
G. paroliniana β Brebissonii (Menegh.) Kütz., 155
G. paroliniana var. *Brebissonii* (Menegh.) Hansg., 155
G. pellucida (Kütz.) Bréb., 47
G. Peniocystis Kütz., 31
G. pleurocapsoides Nov., 51 (fig. 89)
G. polydermatica Kütz., 139 (fig. 276)
G. polydermatica b. *polyzonina* Perty, 18
G. polydermatica f. *polyzonina* Perty, 18
G. polyzonina Perty, 18
G. punctata Näg., 47
G. purpurea Kütz., 31
G. quaternaria Kütz., 139
G. quaternata Kütz., 139 (fig. 278)
G. quaternata var. *major* Gardn., 17 (fig. 146)
G. Ralfsiana Kütz., 46
G. Ralfsii (Harv.) Lemm., 46
G. Reicheltii Richt., 49
G. romana Mont., 140
G. rosea Kütz., 46
G. rubicunda Kütz., 46
G. rubicunda Näg., 119
G. rupestris (Lyngb.) Dalla Torre & Sarnth., 16
G. rupestris Kütz., 47, 49
G. rupestris var. *achroa* Beck-Mannag., 18
G. rupicola Kütz., 16
G. sabulosa (Menegh.) Richt., 164
G. salina Hansg., 140 (fig. 297)
G. salina Roem., 138 (fig. 269)
G. sanguinea (Ag.) Kütz., 45
G. sanguinolenta Kütz., 46 (fig. 61)
G. saxicola Wartm., 48 (fig. 22)
G. scopulorum Näg., 47 (fig. 16)
G. Shuttleworthiana Kütz., 46 (fig. 37)
G. sibogae Weber-v. B., 141 (fig. 268)
G. sparsa Wood, 18
G. sphaerica Gardn., 141 (fig. 270)
G. squamulosa Bréb., 139 (fig. 275)
G. stegophila (Itzigs.) Rabenh., 48
G. stegophila var. *crassa* B. Rao, 18
G. stillicidiorum Kütz., 151 (fig. 350)
G. tenax (Kirchn.) Hollerb., 70
G. tepidarium A. Br., 17 (fig. 157)
G. thermalis Kütz., 16
G. thermalis Lemm., 51
G. Titiana Grun., 48
G. tropica Crouan, 48 (fig. 36)
G. turgida (Kütz.) Hollerb., 70
G. turgida f. *luteola* (Woronich.) Hollerb., 191
G. turgida f. *maxima* (Nyg.) Hollerb., 191
G. turgida f. *mipitanensis* (Wolosz.) Hollerb., 71
G. turgida f. *quaternaria* (Zalessk.) Hollerb., 71
G. turgida f. *subnuda* (Hansg.) Hollerb., 70
G. turgida f. *violacea* (West) Hollerb., 71
G. uvaeformis Roem., 151
G. varia (A. Br.) Hollerb., 48
G. versicolor Näg., 47 (fig. 50)
G. violacea Kütz., 47 (fig. 42)
G. violascea (Corda) Rabenh., 51
G. violascea β *compacta* (Kütz.) Richt., 47
G. violascea var. *compacta* (Kütz.) Richt., 47
G. Zanardini Hauck, 76
G. zostericola Farl., 151
 Gloeocapsaceae Elenk., 12
 Gloeocapsopsis Geitl., 101
 Gloeochaete Lagerh., 151
G. bacillus Kirchn., 151
G. Wittrockiana Lagerh., 151
Gloeococcus agilis Grun., 151
 Gloecystis Näg., 137
G. adnata (L.) Näg., 167
G. ampla (Kütz.) Rabenh., 150
G. ampla b. *vesiculosa* (Näg.) Kirchn., 141
G. Bacillus Teil., 141
G. botryoides (Kütz.) Näg., 138
G. chrysophthalma Mont., 139
G. Clementii (Menegh.) Rabenh., 162
G. confluens (Kütz.) Richt., 139
G. cylindrica Jao, 141
G. fenestralis (Kütz.) A. Br., 150
G. frustulosa (Harv.) W. & G. S. West, 45
G. gigas (Kütz.) Lagerh., 162
G. gigas var. *rufescens* A. Br., 151
G. Grevillei (Berk.) Dr. & Daily, 138
G. infusionum (Schränk) W. & G. S. West, 153
G. marina Hansg., 151 (fig. 343)
G. paroliniana (Menegh.) Näg., 16
G. paroliniana b. *grumosa* Bréb., 155
G. quaternata (Kütz.) Richt., 139
G. riparia A. Br., 140 (fig. 271)
G. rupestris Rabenh., 17
G. rupestris (Lyngb.) Rabenh., 16
G. rupestris var. *subaurantiaca* Hansg., 140 (fig. 295)
G. scopulorum Hansg., 151 (fig. 342)
G. vesiculosa Näg., 141
G. vesiculosa var. *caldarium* Hansg., 140 (fig. 293)
 Gloeotheca Näg. 13
 Gloeotheca sect. *Chromotheca* Kirchn., 150
 Gloeotheca subgen. *Chromotheca* Kirchn., 150
 Gloeotheca sect. *Hyalotheca* Kirchn., 137
 Gloeotheca subgen. *Hyalotheca* Kirchn., 137
Gloeotheca ambigua A. Br., 18
G. Baileyana Schmidle, 151 (fig. 340)
G. caldarium (Richt.) Hollerb., 48
G. carpathica Grun., 17
G. coerulea Geitl., 32
G. confluens (Kütz.) Näg., 139
G. cystifera (Hass.) Rabenh., 16
G. cystifera var. *maxima* West, 151
G. decipiens A. Br., 17 (fig. 149)
G. devia Näg., 17
G. distans Stizenb., 140 (fig. 272)
G. dubia (Wartm.) Geitl., 150
G. endochromatica Gardn., 50 (fig. 53)
G. fuscolutea Näg., 17
G. fuscolutea var. *holochroa* Kütz., 17
G. fuscolutea var. *unilamellaris* Chu, 18
G. Goepfertiana (Hilse) Forti, 140
G. granosa (Berk.) Rabenh., 138
G. Heufleri Grun., 17
G. inconspicua A. Br., 48
G. interspersa Gardn., 18 (fig. 155)
G. involuta Reinsch, 140
G. Kriegeri Frémy, 32

GLOEOTHECE

- G. linearis* Näg., 31
G. linearis f. angusta West, 151
G. linearis var. *composita* G. M. Sm., 29
G. linearis var. *purpurea* Bréb., 31
G. lunata W. & G. S. West, 32
G. magna Wolle, 151
G. mellea (Menegh.) Rabenh., 155
G. membranacea (Rabenh.) Born., 143
G. minor Beck, 151 (fig. 341)
G. monococca (Kütz.) Rabenh., 151
G. monococca var. *mellea* (Menegh.) Kütz., 155
G. nigrescens Rabenh., 18
G. opalothecata Gardn., 141 (fig. 292)
G. palea (Kütz.) Näg., 138
G. palea var. *aeruginea* (Kütz.) Hansg., 16
G. palea var. *cavernarum* (Hansg.) Lemm., 48
G. palmelloides Rabenh., 140
G. parvula Gardn., 50 (fig. 35)
G. prototypa Gardn., 32 (fig. 171)
G. rhodochlamys Skuja, 51 (fig. 72)
G. rupestris (Lyngb.) Born., 16
G. rupestris var. *cavernarum* Hansg., 48
G. rupestris var. *chalybea* Krieg., 18
G. rupestris var. *major* Geitl., 18
G. rupestris f. maxima (West) Hollerb., 151
G. rupestris var. *maxima* West, 151
G. rupestris var. *minor* Jao, 18
G. rupestris b. tepidarium (A. Br.) Hansg., 17
G. rupestris var. *tepidarium* (A. Br.) Hansg., 17
G. samoensis Wille, 49
G. samoensis f. major Wille, 17
G. tepidarium (A. Br.) Lagerh., 17
G. tepidarium var. *cavernarum* Hansg., 48 (fig. 68)
G. tophacea Skuja, 51
G. trichophila Rabenh., 151
G. ustulata Beck-Mannag., 52
G. Vibrio Cart., 141
G. violacea Rabenh., 151
Gloiococcus Shuttlew., 152
G. Grevillei (Ag.) Shuttlew., 152
Gloiodyctyon Ag., 151
G. anastomosans (Hook. f. & Harv.) de Toni, 156
G. Blyttii Ag., 151
Gloionema Ag., 151
G. globiferum Ag., 151
G. Leibleinii Ag., 151
G. paradoxum Ag., 151
G. vermiculare Ag., 151
Godlewskia Jancz., 101
G. aggregata Jancz., 128
GOMPHOSPHERIA Kütz., 93
Gomphospheria subgen. *Coelosphaerium* (Näg.) Elenk., 93
Gomphospheria subgen. *Eugomphospheria* Elenk., 93
Gomphospheria anomala Benn., 18
G. APONINA Kütz., 98 (fig. 179; FIG. 178—180)
G. aponina f. aurantiaca (Bleisch) Forti, 151
G. aponina var. *aurantiaca* Bleisch, 151
G. aponina b. cordiformis Wolle, 98 (fig. 178)
G. aponina f. cordiformis (Wolle) Elenk., 98
G. aponina var. *cordiformis* Wolle, 98
G. aponina f. delicatula (Vir.) Elenk., 98
G. aponina var. *delicatula* Vir., 98
G. aponina var. *gelatinosa* Presc., 98
G. aponina f. limnetica (Vir.) Elenk., 98
G. aponina var. *limnetica* Vir., 98
G. aponina f. major Paval., 98
G. aponina f. multiplex (Nyg.) Elenk., 98
G. aponina var. *multiplex* Nyg., 98
G. aponina f. olivacea (Hansg.) Forti, 98
G. aponina var. *olivacea* Hansg., 98
G. aurantiaca Bleisch, 151
G. compacta (Lemm.) Ström, 96
G. cordiformis (Wolle) Hansg., 98
G. cordiformis var. *olivacea* Hansg., 98 (fig. 180)
G. fusca Skuja, 94 (fig. 177)
G. LACUSTRIS Chod., 96 (FIG. 175, 176)
G. lacustris var. *compacta* Lemm., 96
G. lilacea Vir., 94
G. litoralis Häyr., 97
G. Naegeliana (Ung.) Lemm., 96
G. rosea (Snow) Lemm., 97
G. WICHURAE (Hilse) Dr. & Daily, 94 (fig. 173, 174, 177)
Gomphospheriaceae Elenk., 12
Gonidium Ehrenb., 86
G. Prasiola Menegh., 87
G. punctatum (Ehrenb.) Menegh., 151
G. quadrijugum (Turp.) Menegh., 142
G. quadruplicatum Menegh., 87
G. tranquillum Ehrenb., 87
Goniotrichum ornatum (Ag.) Born., 148
G. ramosum (Thw.) Hauck, 153
Gonium glaucum Ehrenb., 87
G. hyalinum Ehrenb., 151
G. punctatum Ehrenb., 151
G. tranquillum Ehrenb., 87
Guyotia Schmidle, 101
G. singularis Schmidle, 120 (fig. 222)
Gyges rupestris (Kütz.) Kuntze, 167
Haematococcus Ag., 152
Haematococcus subgen. *Ouracoccus* Hass., 137
Haematococcus aeruginosus Hass., 46 (fig. 84)
H. Allmanii Hass., 139
H. alpestris Hass., 51
H. arenarius Hass., 152
H. atomarius Flot., 152
H. austriacus (Kütz.) Trevis., 155
H. binalis Hass., 46
H. Clementii Menegh., 162
H. coccoma (Kütz.) Menegh., 162
H. cryptophilus Hass., 139
H. dalmaticus Zanard., 104
H. frustulosus Harv., 45 (fig. 38)
H. fuliginosus Menegh., 152 (fig. 370)
H. furfuraceus (Berk.) Hass., 138
H. granosus (Berk.) Harv., 138
H. Grevillei Ag., 152 (fig. 372)
H. Hookerianus Berk. & Hass., 139 (fig. 264)
H. insignis Hass., 152
H. kermesinus (Wrang.) Flot., 153
H. lividus (Carm.) Hass., 45
H. microsporus Hass., 141
H. minor (Kütz.) Trevis., 155
H. minutissimus Hass., 192

- H. mucosus* Morr., 152
H. murorum (Grev.) Hass., 164
H. Noltii Ag., 152
H. Orsinii Menegh., 152
H. pluvialis Flot., 152
H. pluvialis var. *atomarius* Flot., 152
H. roseus (Schreb.) Menegh., 153
H. rupestris (Lyngb.) Hass., 16
H. sabulosus (Menegh.) Trevis., 163
H. sanguineus Ag., 45
H. theriacus Hass., 51
H. vesiculosus Morr., 152
H. violasceus (Corda) Menegh., 51
H. vulgaris (Grev.) Hass., 145
Hassallia Trevis., 137
H. Allmanii (Hass.) Trevis., 139
H. cryptophila (Hass.) Trevis., 139
H. Hookeriana (Berk. & Hass.) Trevis., 139
H. insignis (Hass.) Trevis., 152
H. murorum (Grev.) Trevis., 164
Heterocyanoascus Kuff., 152
H. Haumanii Kuff., 152
Holopediaceae Elenk., 12
Holopedium Lagerh., 92
Holopedium subgen. *Coccopedia* (Troitzk.) Elenk., 86
Holopedium subgen. *Euholopedium* Forti, 86
Holopedium subgen. *Microcrocis* Forti, 92
Holopedium bellum Beck-Mannag., 92
H. Clementei Gonz., 87
H. dednense Peval., 90
H. Dieteli (Richt.) Mig., 92
H. geminatum Lagerh., 92
H. granularum Skuja, 92
H. irregulare Lagerh., 90
H. Mutisianum Gonz., 87
H. obvolutum Tiff., 92
H. pulchellum Buell, 87
H. sabulicola Lagerh., 89
Homalococcus Kütz., 157
H. Hassallii Kütz., 157
Hormathonema Erceg., 102
H. epilithicum Erceg., 105
H. longicellulare Erceg., 105
H. luteo-brunneum Erceg., 104
H. paulocellulare Erceg., 104
H. sphaericum Erceg., 105
H. violaceo-nigrum Erceg., 104
Hormospora pellucida Dick., 85 (fig. 182)
H. pusilla Itzigs., 145
H. ramosa Thw., 152
H. scalariformis G. S. West, 85
Hormothece Jao, 137
H. rupestris Jao, 141
Hyalococcus Schröt., 153
H. Beigeli Schröt., 159
H. pneumoniae Schröt., 153
Hydrococcus Kütz., 101
Hydrococcus Link, 101
H. Brebissonii (Menegh.) Kütz., 127
H. Cesatii Rabenh., 127 (fig. 221)
H. ericetorum Kütz., 153
H. guadelupensis Crouan, 153
H. lacustris Brügg., 153
H. Lemaniae (Ag.) Born., 127
H. marinus Grun., 111
H. rivularis Kütz., 119 (fig. 217)
H. ulvaceus Kütz., 119 (fig. 223)
Hydroepicoccum genuense de Not., 94 (fig. 174)
Hydrogastrum Desv., 167
H. granulatum (L.) Desv., 167
Hydrurus Ag., 148
H. Ducluzeli Ag., 144
H. foetidus (Vill.) Trevis., 148
H. Myosurus (Ducluz.) Trevis., 144
H. Vaucheri Ag., 148
Hyella Born. & Flah., 101
H. Balanii Lehm., 103 (fig. 185)
H. caespitosa Born. & Flah., 103
H. caespitosa var. *nitida* Batt., 103
H. caespitosa var. *spirorbicola* Hansg., 103
H. dalmatica Erceg., 104
H. endophytica Børges., 112
H. fontana Hub. & Jad., 120
H. fontana var. *maxima* Geitl., 122
H. fontana var. *rubra* Nads., 121
H. fonticola Hub. & Jad., 120
H. infestans Howe, 153
H. jurana Chod., 121
H. linearis Setch. & Gardn., 112 (fig. 206)
H. Littorinae Setch. & Gardn., 103
H. socialis Setch. & Gardn., 112
H. tenuior Erceg., 104
H. terrestris Chod., 153
H. voluticola Chod., 104
Hyellaceae Erceg., 100
Hyellococcus Schmidle, 101
H. niger Schmidle, 120 (fig. 230)
Hyphelia aurantiaca Lib., 153 (fig. 355)
Illosporium roseum (Schreb.) Link, 153
Inoderma Kütz., 153
I. fontanum Kütz., 153
I. lamellosum Kütz., 153
I. lamellosum b. *fontanum* (Kütz.) Rabenh., 153
I. lamellosum var. *fontanum* (Kütz.) Rabenh., 153
I. majus Hansg., 140 (fig. 288)
JOHANNESBAPTISTIA J. de Toni, 84
J. Gardneri Frémy, 85
J. PELLUCIDA (Dick.) W. R. Taylor & Dr., 85
(FIG. 182—184)
J. primaria (Gardn.) J. de Toni, 85
J. Willei (Gardn.) J. de Toni, 85
Keratococcus Pasch., 149
K. caudatus (Hansg.) Pasch., 149
K. raphidioides (Hansg.) Pasch., 149
K. sabulosus (Hansg.) Pasch., 140
Krkia Peval., 14
K. croatica Peval., 32
Lamprocystis Schröt., 163
L. ROSEA (Kütz.) Dr. & Daily, 155
L. roseo-persicina (Kütz.) Schröt., 163
Lampropedia Schröt., 151
L. hyalina (Ehrenb.) Schröt., 151
L. littoralis (Oerst.) de Toni & Trevis., 150
L. ochracea (Mettenh.) de Toni & Trevis., 154
L. Reitenbachii (Casp.) de Toni & Trevis., 154
L. rosea (Winogr.) de Toni & Trevis., 166
L. violacea (Kütz.) de Toni & Trevis., 154
Lankesteron roseo-persicinum (Kütz.) Ellis, 163

LEMMERMANNIA

Lemmermannia Chod., 166
 Lemmermannia Elenk., 148
L. emarginata (Schröd.) Chod., 166
L. pallida (Lemm.) Elenk., 148
Lemmermanniella Geitl., 148
L. pallida (Lemm.) Geitl., 148
Lepra botryoides (L.) Web., 145
L. infusionum Schrank, 153
L. lactea (L.) Web., 145
L. murorum (Grev.) Schaer., 164
L. rosea Hoffm., 153
Lepraria atra Ach., 51
L. botryoides (L.) Ach., 145
L. infusionum Schrank, 153
L. kermesina Wrang., 153
L. murorum Grev., 164
L. rosea (Schreb.) Ach., 153
L. rubens (Hoffm.) Ach., 153
L. viridis (Lam.) Jenn., 145
Lichen botryoides (L.) Hag., 145
L. lacteus (L.) Schreb., 145
L. roseus Schreb., 153
L. rubens Hoffm., 153
Limnodictyon Kütz., 154
L. obscurum Dick., 154
L. Roemerianum Kütz., 154 (fig. 344)
Linckia fragiformis Roth, 129
L. granulata (L.) Web., 167
Lithocapsa Erceg., 102
L. fasciculata Erceg., 121
Lithococcus Erceg., 102
L. ramosus Erceg., 122
Lithomyxa Howe, 154
L. calcigena Howe, 154
L. calcigena f. ferrifera Howe, 154
Marssoniella Lemm., 93
M. andicola Tut., 154
M. carpetana Gonz., 154
M. elegans Lemm., 97
Merismopoedia Kütz., 86
Merismopoedia subgen. *Eumerismopodia* Rypp., 86
Merismopoedia subgen. *Holopedium* Lagerh., 92
Merismopoedia subgen. *Pseudoholopodia* Rypp., 86
Merismopoedia aeruginea Bréb., 89 (fig. 136)
M. aeruginea f. ovata Wille, 90
M. aeruginea b. violacea Rabenh., 154
M. aeruginea var. violacea (Kütz.) Rabenh., 154
M. affixa Richt., 87
M. angularis Thomps., 92
M. aurantiaca Magg., 154
M. boreocaspica Henck., 90
M. cuspica Henck., 90
M. chondroidea Wittr., 154
M. convoluta Bréb., 89 (fig. 139)
M. convoluta b. aeruginosa Rabenh., 89
M. convoluta var. aeruginosa Rabenh., 89
M. convoluta f. minor Wille, 87
M. convoluta var. minor (Wille) Tiff. & Ahlstr., 87
M. cubica West, 49
M. cyanea Playf., 87
M. duplex Playf., 87
M. elegans A. Br., 89 (fig. 134)
M. elegans var. constricta Playf., 90

M. elegans var. major G. M. Sm., 90
M. elegans var. mandalensis Wille., 154
M. elegans var. marina Lagerh., 89
M. elegans var. remota G. S. West, 87
M. elegans var. ulvacea Bern., 90
M. elongata Kossinsk., 90
M. Gardneri (Coll.) Setch., 90
M. geminata Lagerh., 92 (fig. 181)
M. gigas Rypp., 90
M. glauca (Ehrenb.) Kütz., 87
M. glauca var. amethystina Lagerh., 89
M. glauca subsp. amethystina Lagerh., 89 (fig. 138)
M. glauca var. fontinalis Hansg., 87 (fig. 133)
M. glauca var. fontinalis f. irregularis Selk., 87
M. glauca f. insignis (Schkorb.) Geitl., 87
M. glauca f. mediterranea (Näg.) Coll., 90
M. glauca f. minor Häyr., 87
M. glauca var. punctata (Meyen) Hansg., 87
M. glauca f. rosea Geitl., 87
M. Goodsirii Husem., 165
M. Haumanii Kuff., 87
M. hyalina (Ehrenb.) Kütz., 151
M. hyalina f. salina Wille, 87
M. hyalina subsp. Warmingiana Lagerh., 87
M. insignis Schkorb., 87
M. irregularis Lagerh., 90
M. Jeaneli Bachm., 90
M. Kuetzingii Næg., 87
M. littoralis (Oerst.) Rabenh., 150
M. major (G. M. Sm.) Geitl., 90
M. major Kütz., 89 (fig. 135)
M. Marssonii Lemm., 154
M. Massartii Kuff., 154
M. mediterranea Næg., 90 (fig. 142)
M. minima Beck, 87
M. nova Wood, 87
M. ochracea Mettenh., 154
M. paludosa Benn., 87
M. Prasiola (Menegh.) Trevis., 87
M. punctata Meyen, 87
M. punctata f. arctica Kossinsk., 87
M. punctata f. minor Lagerh., 87
M. punctata var. oblonga Playf., 87
M. punctata var. vacuolata Playf., 154
M. quadruplicata (Menegh.) Trevis., 87
M. rectangularis Schill., 154
M. Reitenbachii Casp., 154 (fig. 300)
M. renis (Hepw.) Rabenh., 164
M. revolutiva Asken., 90
M. sabulicola Lagerh., 89
M. sinica Ley, 154
M. Smithii J. de Toni, 90
M. solitaria Henck., 90
M. tenuissima Lemm., 87
M. Terekii Henck., 90
M. thermalis Kütz., 89 (fig. 140)
M. thermalis b. major (Kütz.) Rabenh., 89
M. tranquilla (Ehrenb.) Trevis., 87
M. Trolleri Bachm., 154
M. urinae (Rossm.) Rabenh., 165
M. ventriculii (Goods.) Robin, 165
M. violacea Kütz., 154 (fig. 299)
M. Warmingiana Lagerh., 87
M. Willei Gardn., 90 (fig. 137)

MERISMOPOEDIACEAE

- Merismopoediaceae Elenk., 11
 Merrettia S. F. Gray, 166
 M. adnata (L.) S. F. Gray, 167
 M. alpicola (Lyngb.) S. F. Gray, 45
 M. coriacea S. F. Gray, 167
 M. miniata (Leibl.) Trevis., 157
 M. mucosa (Kütz.) Trevis., 157
 M. protuberans (Sm. & Sow.) S. F. Gray, 137
 Mesotaenium Braunii de Bary, 158
 M. macrococcum Kütz., 158
 M. macrococcum var. micrococcum (Kütz.) Kirchn., 158
 M. rubescens (Bréb.) Dr. & Daily, 158
 Micraloa Bias., 154
 M. aeruginosa Kütz., 36 (fig. 9)
 M. aurantiaca Kütz., 155
 M. botryoides Kütz., 156
 M. elabens Bréb., 28 (fig. 168)
 M. firma Kütz., 66
 M. flos-aquae (L.) Trevis., 145
 M. ichthyoblabe (Kütz.) Rabenh., 36
 M. ictyolabe Menegh., 36
 M. olivacea Kütz., 162
 M. pallida Kütz., 156
 M. Pinii Kütz., 154
 M. Pini-turinorum Bias., 154
 M. protogenita Bias., 154
 M. rosea Kütz., 155
 M. rupestris (Lyngb.) Kütz., 16
 M. teres Flot., 155
 M. violacea (Kütz.) Bréb., 154
 MICROCROCIS Richt., 92
 M. Dieteli Richt., 92 (fig. 181)
 M. GEMINATA (Lagerh.) Geitl., 92 (FIG. 181)
 M. irregularis (Lagerh.) Geitl., 90
 M. pulchella (Buell) Geitl., 87
 M. sabulicola (Lagerh.) Geitl., 89
 Microcystaceae Elenk., 152
 Microcystidaceae Elenk., 152
 Microcystis Kütz., 152
 Microcystis Unterabt. Anacystis (Menegh.) Kütz., 34
 Microcystis subgen. Capsotheca Elenk., 137
 Microcystis subgen. Eumicrocystis Elenk., 152
 Microcystis α Macroscopicae Elenk., 13
 Microcystis α Macroscopicae subgen. Eucocochloris Elenk., 13
 Microcystis Unterabt. Microcystis Kütz., 152
 Microcystis Unterabt. Polycystis Kütz., 34
 Microcystis adnata (L.) Menegh., 167
 M. aeruginosa Kütz., 36
 M. aeruginosa var. elongata B. Rao, 37
 M. aeruginosa f. flos-aquae (Wittr.) Elenk., 36
 M. aeruginosa f. major (Wittr.) Elenk., 36
 M. aeruginosa var. major Elenk., 36
 M. aeruginosa var. major Wittr., 36
 M. aeruginosa f. marginata (Menegh.) Elenk., 46
 M. aeruginosa f. minor Elenk., 37
 M. aeruginosa f. occidentalis W. R. Taylor, 36
 M. aeruginosa f. ochracea (Brand) Elenk., 36
 M. aeruginosa f. protocystis (Crow) Elenk., 36
 M. aeruginosa f. pseudofilamentosa (Crow) Elenk., 37
 M. aeruginosa var. robusta (Clark) Nyg., 36
 M. aeruginosa f. scripta (Richt.) Elenk., 36
 M. aeruginosa f. sphaerodictyoides Elenk., 37
 M. aeruginosa f. viridis (A. Br.) Elenk., 36
 M. amethystina (Filársz.) Forti, 51
 M. amethystina var. vinea Printz, 52
 M. angulata Zalesk., 29
 M. angulosa (Corda) Kütz., 161
 M. anodontae (Hansg.) Elenk., 120
 M. aphanothecoides Zalesk., 29
 M. argentea Schill., 155
 M. atra (Ach.) Kütz., 51
 M. atrovirens (Corda) Kütz., 141
 M. austriaca Kütz., 155
 M. botrys Teil., 37
 M. Brebissonii Menegh., 155 (fig. 319)
 M. bulbosa (Kütz.) Menegh., 16
 M. caerulea Dick., 36
 M. chroococcoidea W. & G. S. West, 141
 M. chroococcoidea var. minor Nyg., 155
 M. clarionensis (Setch. & Gardn.) J. de Toni, 104
 M. conferta (Kütz.) Geitl., 111
 M. densa G. S. West, 49
 M. deusta Menegh., 103
 M. Donnellii Wolle, 155
 M. elabens (Bréb.) Kütz., 28
 M. elabens var. major Bachm., 94
 M. elabens var. minor Nyg., 28
 M. elabentoides Zalesk., 29
 M. endophytica (G. M. Sm.) Elenk., 67
 M. exigua Zalesk., 67
 M. firma (Kütz.) Schmidle, 66
 M. floccosa Zalesk., 29
 M. flos-aquae (Wittr.) Kirchn., 36
 M. flos-aquae var. major Nyg., 37
 M. flos-aquae var. robusta (Clark) Nyg., 36
 M. fusca Zalesk., 37
 M. fuscolutea (Hansg.) Forti, 119
 M. gelatinosa Menegh., 16
 M. glauca (Wolle) Dr. & Daily, 66
 M. globosa Zalesk., 29
 M. granosa (Berk.) Menegh., 138
 M. granulosa Menegh., 138
 M. Grevillei (Ag.) Kütz., 152
 M. Grevillei (Berk.) Elenk., 138
 M. Grevillei f. pulchra (Kütz.) Elenk., 28
 M. Grevillei f. rivularis (Carm.) Elenk., 138
 M. Hansgirgiana Elenk., 49
 M. holsatica Lemm., 42
 M. holsatica f. minor (Lemm.) Hollerb., 147
 M. holsatica var. minor Lemm., 147
 M. ichthyoblabe Kütz., 36
 M. ichthyoblabe var. purpurascens A. Br., 161
 M. ichthyoblabe var. violacea (Itzigs.) Forti, 192
 M. incerta Lemm., 42
 M. incerta var. elegans Lemm., 43
 M. kerguelensis Wille, 18
 M. Koordersii (Strøm) Elenk., 67
 M. litoralis (Hansg.) Forti, 17
 M. livida (Carm.) Menegh., 45
 M. lobata Dick., 155
 M. lutescens Schill., 37
 M. marginata (Menegh.) Kütz., 46
 M. marginata var. minor Hansg., 160
 M. marina Kütz., 162

MICROCYSTIS

M. maxima Bern., 18
M. mellea Menegh., 155
M. merismopedioides Fritsch, 155
M. microspora Menegh., 16
M. Migulæ J. de Toni, 43
M. minima Bern., 67
M. minor Kütz., 155 (fig. 318)
M. minuta Kyl., 113
M. minuta var. *aeruginosa* Lindst., 113
M. minuta var. *violacea* Lindst., 155 (fig. 316)
M. minutissima West, 42
M. montana (Teod.) J. de Toni, 51
M. Morrenii Menegh., 152
M. muscicola (Menegh.) Elenk., 46
M. natans Lemm., 43
M. nigra Menegh., 46 (fig. 64)
M. Noltii (Ag.) Kütz., 152
M. ochracea (Brand) Forti, 36
M. olivacea Kütz., 155 (fig. 320)
M. orissica West, 32
M. ovalis Hollenb., 104
M. Packardii (Farl.) Tild., 28
M. pallida (Kütz.) Lemm., 16
M. pallida Mig., 43 (fig. 13)
M. paludosa (Rabenh.) Forti, 143
M. parasitica Kütz., 155 (fig. 317)
M. parasitica var. *glacialis* Fritsch, 44
M. parietina (Näg.) Elenk., 140
M. paroliniana Menegh., 16 (fig. 152)
M. piscinalis (Brügg.) Forti, 18
M. prasina (Witr.) Lemm., 36
M. protocystis Crow, 36 (fig. 5)
M. protogenita (Bias.) Rabenh., 154
M. pseudofilamentosa Crow, 36
M. pulchra Flor., 121
M. pulvereæ (Wood) Forti, 67
M. pulvereæ f. *conferta* (W. & G. S. West) Elenk., 43
M. pulvereæ f. *delicatissima* (W. & G. S. West) Elenk., 43
M. pulvereæ f. *elachista* (W. & G. S. West) Elenk., 49
M. pulvereæ f. *elongata* Crow, 43
M. pulvereæ f. *holsatica* (Lemm.) Elenk., 42
M. pulvereæ f. *incerta* (Lemm.) Elenk., 42
M. pulvereæ var. *incerta* (Lemm.) Crow, 42
M. pulvereæ f. *irregularis* (Boye P.) Elenk., 67
M. pulvereæ var. *major* Elenk., 52
M. pulvereæ f. *minor* (Lemm.) Hollerb., 147
M. pulvereæ f. *parasitica* (Kütz.) Elenk., 155
M. pulvereæ f. *planconica* (G. M. Sm.) Elenk., 67
M. pulvereæ f. *pulchra* (Lemm.) Elenk., 67
M. pulvereæ var. *racemiformis* Nyg., 67
M. pulvereæ f. *stagnalis* (Lemm.) Elenk., 67
M. punctata Schill., 37
M. punctiformis (Kütz.) Kirchn., 160
M. ramosa Bharadw., 37
M. Reinboldii (Richt.) Forti, 48
M. robusta (Clark) Nyg., 36
M. Roeseana (de Bary) Elenk., 69
M. rosea Kuff., 155
M. rosea (Schreb.) Kütz., 153
M. rubescens (Bréb.) Menegh., 158

M. rufescens Mart., 155
M. rupestris (Lyngb.) Kütz., 16
M. salina (Woronich.) Elenk., 191
M. sanguinea (Ag.) Kütz., 45
M. scopulorum Næg., 47
M. scripta (Richt.) Mig., 36
M. splendens Hollenb., 104
M. stagnalis Lemm., 67
M. stagnalis var. *pulchra* Lemm., 67
M. stereophysalis Menegh., 155
M. testacea (A. Br.) Elenk., 78
M. thermalis Yon., 52
M. toxica Steph., 36 (fig. 1)
M. umbrina Kütz., 155
M. violascea (Corda) Kütz., 51
M. viridis (A. Br.) Lemm., 36
Microdiscus Steinecke, 155
M. parasiticus Steinecke, 155
Microhaloa Kütz., 156
M. aeruginosa Kütz., 36
M. aurantiaca Kütz., 155 (fig. 314)
M. botryoides Kütz., 156 (fig. 313)
M. elabens Bréb., 28
M. firma Kütz., 66
M. jodes Itzigs., 161
M. major Kütz., 156 (fig. 312)
M. pallida Kütz., 156 (fig. 315)
M. rupestris (Lyngb.) Kütz., 16
M. Pinii Kütz., 154
M. protogenita (Bias.) Kütz., 154
M. virescens (Hass.) Kütz., 165
Monasella Gaill., 144
M. uva Gaill., 145
Monilia cinnabarina Spreng., 153
M. viridis (Lam.) Spreng., 145
Monocapsa Itzigs., 34
M. stegophila Itzigs., 48 (fig. 48)
Montanoa Gonz., 156
M. castellana Gonz., 156
Myrionema crustaceum J. Ag., 103 (fig. 250)
Myxobactron Schmidle, 156
M. hirundiforme G. S. West, 156
M. palatinum Schmidle, 156
M. Usterianum Schmidle, 156
Myxohyella Geitl., 101
M. Cavanillesiana Gonz., 113
M. endophytica (Børges.) Geitl., 112
M. Howei Geitl., 110
M. infestans (Howe) Geitl., 153
M. linearis (Setch. & Gardn.) Geitl., 112
M. lutea (Setch. & Gardn.) Geitl., 110
M. seriata Hollenb., 104
M. socialis (Setch. & Gardn.) Geitl., 112
Myxosarcina Printz, 35
M. burmensis Skuja, 156
M. chroococcoides Geitl., 79
M. concinna Printz, 52
M. salina Frémy, 105
M. spectabilis Geitl., 121
M. spectabilis f. *regularis* Geitl., 122
M. sphaerica Proschk.-Lavr., 79
Nelliecarteria J. de Toni, 164
N. ramosa (Cart.) J. de Toni, 164
Nematoradaisia Geitl., 101
N. gasteropodum Gonz., 105
N. Laminariae (Setch. & Gardn.) Geitl., 112

NODULARIA

- Nodularia fusca* W. R. Taylor, 85 (fig. 183)
Nostoc botryoides (L.) Ag., 145
N. fluviatile Bréb., 127
N. Lemaniae Ag., 127 (fig. 239)
N. microscopium var. *linguiforme* Hansg., 66 (fig. 96)
N. Trentepohlii Mohr, 66
Nostocella Lemaniae (Ag.) Gaill., 127
Olivia S. F. Gray, 144
O. botryoides (L.) S. F. Gray, 145
O. cruenta (Sm. & Sow.) S. F. Gray, 167
Oncobrysa Ag., 156
O. adriatica Hauck, 111 (fig. 208, 209)
O. adriatica var. *micrococca* Hansg., 111
O. Brebissonii Menegh., 127 (fig. 245)
O. britannica Fritsch, 126
O. Castagnei Bréb., 28
O. Cesatiana Rabenh., 127
O. ericetorum (Kütz.) Rabenh., 153
O. fluviatilis Ag., 156 (fig. 348, 360)
O. guadelupensis Crouan, 153
O. hispanica Lewin, 128
O. lacustris Schröt. & Kirchn., 156
O. Lemaniae (Ag.) Gom., 127
O. marina (Grun.) Rabenh., 111
O. rivularis (Kütz.) Menegh., 119
O. rivularis var. *Brebissonii* (Menegh.) Hansg., 127
O. rivularis var. *subsalsa* Hansg., 103
O. rivularis var. *ulvacea* (Kütz.) Hansg., 119
O. sarcinoides Elenk., 121
O. sarcinoides var. *fulvo-cubica* Elenk., 121
O. sarcinoides var. *irregulariter-consociata* Elenk., 121
O. sarcinoides var. *irregulariter-consociata* f. *fusca* Elenk., 121
O. sarcinoides var. *irregulariter-consociata* f. *pallida* Elenk., 121
O. sarcinoides var. *sparsa* Elenk., 121
O. sparsa Rabenh., 156
O. ulvacea (Kütz.) Rabenh., 119
Onkonema Geitl., 156
O. compactum Geitl., 156
Oocystis cyanea Näg., 150
O. geminata Näg., 47
O. minor Itzigs., 47
Oscillatoria clavata Corda, 156
O. limnetica var. *acicularis* f. *brevis* Nyg., 156
Pagerogala Wood, 156
P. stellio Wood, 156
Palmella Lyngb., 144
Palmella Untergatt. *Ditoe* Näg., 157
Palmella Untergatt. *Tetratoce* Näg., 157
Palmella adnata (L.) Lyngb., 167
P. adriatica Kütz., 139 (fig. 287)
P. aequalis Näg., 157
P. aeruginosa Carm., 46
P. alpicola Lyngb., 45
P. anastomosans Hook. f. & Harv., 156
P. aurantia Ag., 156 (fig. 361)
P. bituminosa (Bory) Menegh., 137
P. borealis Kütz., 139 (fig. 279)
P. botryoides (L.) Lyngb., 145
P. botryoides var. *musciola* (Menegh.) Hansg., 46
P. botryoides var. *uda* Kütz., 138
P. Botteriana Kütz., 139 (fig. 282)
P. Brebissonii Kütz., 119
P. brunnea A. Br., 47 (fig. 87)
P. bulbosa Kütz., 16
P. Castagnei Kütz., 28
P. chrysophthalma Mont., 139 (fig. 273)
P. coccinea Kunze, 162
P. conferta Kütz., 111 (fig. 211)
P. crassa Nacc., 137 (fig. 289)
P. cruenta (Sm. & Sow.) Ag., 167
P. crustacea Zanard., 104
P. cryptophila Carm., 139
P. cryptophylla Carm., 45
P. cuprina Ag., 16
P. cyanea Kütz., 36
P. cylindrica Lyngb., 156
P. cylindrospora Bréb., 157
P. depressa Berk., 157
P. dura Wood, 121
P. duriuscula Kütz., 119 (fig. 220)
P. effusa Kütz., 157
P. firma Bréb. & Lenorm., 66
P. flava Kütz., 157 (fig. 349)
P. frustulosa Carm., 45
P. furfuracea Berk., 138
P. fuscata Zanard., 51
P. fusiformis Roem., 157
P. gelatinosa Menegh., 16
P. gigantea Sommerf., 157
P. globosa Ag., 157
P. globosa Lenorm., 147
P. granosa Berk., 138
P. Grevillei Berk., 138 (fig. 274)
P. grumosa Carm., 138
P. heterococca Kütz., 17 (fig. 153)
P. heterospora Rabenh., 157
P. hormospora Menegh., 157 (fig. 356)
P. hyalina Lyngb., 157
P. hyalina β *musciola* Carm., 138 (fig. 298)
P. hyalina var. *musciola* (Carm.) Harv., 138
P. hyalina δ *rivularis* (Carm.) Kütz., 138
P. hyalina f. *rivularis* (Carm.) Crouan, 138
P. hyalina γ *seriata* Kütz., 66 (fig. 95)
P. ichthyoblabe Kunze, 36
P. ictyolabe Kunze, 36
P. Jesenii Wood, 17
P. laxa Kütz., 139 (fig. 291)
P. littoralis Crouan, 138
P. littorea Crouan, 140 (fig. 296)
P. livida Carm., 45 (fig. 65)
P. margaritacea Kütz., 139 (fig. 286)
P. marginata (Menegh.) Kütz., 46
P. mediterranea Kütz., 103 (fig. 193)
P. mellea (Menegh.) Kütz., 155
P. microspora (Menegh.) Kütz., 16
P. miniata Leibl., 157
P. miniata b. *aequalis* Näg., 157
P. miniata var. *aequalis* Näg., 157
P. minuta Ag., 157
P. mirifica Rabenh., 157
P. montana (Lightf.) Ag., 45
P. Mooreana Harv., 16 (fig. 158)
P. mucosa Kütz., 157
P. musciola (Menegh.) Kütz., 46

PALMELLA

P. Myosurus (Ducluz.) Lyngb., 144
P. nivalis (Bauer) Hook., 167
P. obscura Sommerf., 16
P. oceanica Crouan, 103 (fig. 190)
P. Orsiniana (Menegh.) Kütz., 147
P. pallida Kütz., 16
P. papillosa Kütz., 126 (fig. 375)
P. parietina Näg., 139 (fig. 280)
P. partibilis Suhr, 158
P. parvula Kütz., 157 (fig. 362)
P. pelludissima Bory, 158
P. pila Suhr, 158
P. placentaris Wallr., 46
P. protuberans (Sm. & Sow.) Grev.; Ag., 137
P. pulchra Kütz., 28
P. Ralfsii Harv., 46
P. rivularis Carm., 138 (fig. 294)
P. rosea (Schreb.) Lyngb., 153
P. rubescens Bréb., 158
P. rupestris Lyngb., 15 (fig. 148)
P. sanguinea Ag., 45 (fig. 80)
P. sanguinea (Pers.) Ehrenb., 166
P. sordida Kütz., 138 (fig. 283)
P. submarina Crouan, 103
P. sudetica Rabenh., 66 (fig. 94)
P. terminalis Ag., 158
P. testacea A. Br., 78 (fig. 127)
P. tuberculosa Hansg., 112
P. uvaeformis Kütz., 158
Palmellaceae (Kütz.) Näg., 144
Palmelleae Kütz. (as family), 144
Palmodicryon Hookeri Kütz., 156
Palmogloea Kütz., 137
P. aeruginosa Zanard., 76 (fig. 110)
P. aureo-nucleata Bréb., 158
P. Brebissonii (Menegh.) Kütz., 157
P. crassa Kütz., 158
P. dimorpha Kütz., 158
P. gigantea Kütz., 158 (fig. 364)
P. Grevillei (Berk.) Crouan, 138
P. lurida Flot., 158
P. macrococca Kütz., 158
P. Meneghinii Kütz., 157
P. micrococca Kütz., 158
P. microspora (Menegh.) Crouan, 16
P. monococca Kütz., 150
P. monococca α aeruginea Kütz., 150
P. monococca β mellea (Menegh.) Kütz., 155
P. Mooreana (Harv.) Crouan, 16
P. protuberans (Sm. & Sow.) Kütz., 137
(FIG. 255—298)
P. Roemeriana Kütz., 154
P. rubescens (Bréb.) Kütz., 158
P. rupestris Kütz., 158
P. saxicola Näg., 31
P. vesiculosa Kütz., 139
Palmophyllum crassum (Nacc.) Rabenh., 138
P. foliaceum G. S. West, 120
Paracapsa Naum., 158
P. siderophila Naum., 158
Pascherinema J. de Toni, 150
P. gracile (Pasch.) J. de Toni, 150
P. moniliforme (Pasch.) J. de Toni, 150
Pascherinemataceae Geidl., 150

Paulinella Lauterb., 158
P. chromatophora Lauterb., 158
Pediochloris Geidl., 144
P. parallela (Szaf.) Geidl., 144
Pediococcus Maggiorae de Toni & Trevis., 154
Peliaina Pasch., 158
P. cyanea Pasch., 158
Pelodicryon Lauterb., 143
P. clathratiforme Szaf., 143
P. Lauterbornii (Szaf.) Geidl., 143
Peniocystis purpurea Bréb., 31
Penium Brebissonii (Menegh.) Ralfs, 157
P. rupestre (Kütz.) Rabenh., 167
Phaeodermatium Hansg., 191
P. rivulare Hansg., 191
Phytoconis Bory, 144
P. alpicola (Lyngb.) Menegh., 45
P. botryoides (L.) Bory, 145
P. cruenta (Sm. & Sow.) Trevis., 167
P. hormospora (Menegh.) Trevis., 157
P. lactea (L.) Bory, 145
P. livida (Carm.) Bréb., 45
P. miniata Bréb., 155
P. natans Bory, 145
P. sordida Bréb., 46
Pilgeria Schmidle, 158
P. brasiliensis Schmidle, 158
Placoma Schousb. & Thur., 101
P. africana Wille, 120
P. corticalis Schousb., 158
P. fusca Schousb., 158
P. lapidea Schousb., 158
P. marina (Grun.) Born. & Thur., 111
P. membranacea Schousb., 158
P. vesiculosa Schousb. & Thur., 103
P. violacea Setch. & Gard., 103
P. Willei Gardn., 50 (fig. 66)
Planosphaerula Borzi, 35
P. natans Borzi, 31
Pleococcus botryoides (L.) Trevis., 145
P. Grevillei (Berk.) Trevis., 138
P. viridis (Lam.) Kütz., 145
Pleurocapsa Thur., 101
P. amethystea Rosenv., 112
P. amethystea var. *Schmidtii* Coll., 112
P. aurantiaca Geidl., 122
P. Bradypodis (Weber-v. B.) Hansg., 159
P. caldaria (Tild.) Setch., 161
P. Choloepodis (Weber-v. B.) Hansg., 159
P. concharum Hansg., 120
P. conferta (Kütz.) Setch., 111
P. crepidinum Coll., 103
P. crepidinum (Thur.) Erceg., 103
P. cuprea Hansg., 120
P. cuprea f. *pirinica* Petk., 122
P. Deeveyi Dr., 104
P. entophyaloides Setch. & Gardn., 104
P. epiphytica Gardn., 128 (fig. 205)
P. Ercegovicii J. de Toni, 103
P. fissurarum Erceg., 104
P. fluvialis Lagerh., 128 (fig. 240)
P. fluvialis var. *subsalsa* Hansg., 103 (fig. 188)
P. fuliginosa Hauck, 103 (fig. 189)
P. gloeocapsoides Setch. & Gardn., 104
P. Kernerii (Hansg.) Dr., 128
P. magna Weber-v. B., 103

PLEUROCAPSA

- P. Mayorii* Setch., 49 (fig. 40)
P. minor Hansg., 120 (fig. 224)
P. minuta Geitl., 105
P. muralis Lagerh., 49
P. parenchymatica Geitl., 159
P. polonica Racib., 120
P. rivularis Hansg., 120
P. salevensis Chod., 121
P. subgelatinosa Geitl., 128
P. Usteriana Schmidle, 159
P. varia (A. Br.) Dr. & Daily, 48
P. violacea Weber-v. B., 113
Pleurocapsaceae Geitl., 100
Pleurococcus Menegh., 34
Pleurococcus Untergatt. Dichococcus Näg., 163
Pleurococcus Untergatt. Tetrachococcus Näg., 145
Pleurococcus alpestris (Hass.) Trevis., 51
P. amplus (Kütz.) Rabenh., 150
P. angulosus (Corda) Menegh., 161
P. angulosus var. *irregularis* Hansg., 159
P. angulosus a. *palustris* (Kütz.) Kirchn., 161
P. angulosus f. *palustris* Kütz., 161
P. angulosus b. *tectorum* (Kütz.) Kirchn., 164
P. angulosus f. *tectorum* Trevis., 159
P. antarcticus W. & G. S. West, 159
P. antarcticus f. *filamentosus* Fritsch, 159
P. antarcticus f. *minor* Fritsch, 159
P. antarcticus f. *robustus* W. & G. S. West, 159
P. antarcticus f. *simplex* Fritsch, 159
P. antarcticus f. *stellatus* Fritsch, 159
P. antarcticus f. *typicus* Fritsch, 159
P. aquaticus Snow, 159
P. aureo-viridis (Kütz.) Rabenh., 161
P. Beigelii Kuchenm. & Rabenh., 159
P. Beyerinckii Art., 192
P. binalis (Hass.) Trevis., 46
P. bituminosus (Bory) Trevis., 137
P. Bradypii Kuhn, 159
P. calcarius Boye P., 159
P. Choloepii Kuhn, 159
P. cinnamomeus Menegh., 159
P. coerulescens Bréb., 32
P. cohaerens Bréb., 78 (fig. 125)
P. communis Menegh., 46 (fig. 83)
P. conglomeratus Art., 159
P. crenulatus Hansg., 159 (fig. 335)
P. crepidinum (Thur.) Rabenh., 103
P. dermochrous Näg., 119
P. dimidiatus (Kütz.) Trevis., 70
P. dissectus (Kütz.) Trevis., 139
P. ellipticus Menegh., 159
P. frigidus W. & G. S. West, 159
P. gigas (Kütz.) Trevis., 162
P. glaucus Crouan, 104
P. glomeratus Menegh., 119 (fig. 234)
P. julianus Menegh., 119 (fig. 225)
P. Koetlitzii Fritsch, 159
P. Kuetzingii G. S. West, 163
P. magma (Bréb.) Menegh., 46
P. marinus Coll., 160
P. marinus Hansg., 160
P. marinus f. *major* Hansg., 160
P. membraninus Menegh., 77 (fig. 123)
P. Meneghinii Bréb., 161
P. miniatus (Kütz.) Näg., 163
P. miniatus var. *fuscescens* Hansg., 160 (fig. 336)
P. minatus var. *roseolus* Hansg., 160 (fig. 337)
P. miniatus var. *roseus* (Menegh.) de Toni, 192
P. miniatus var. *virescens* Hansg., 140 (fig. 281)
P. minor (Kütz.) Rabenh., 163
P. minutus (Kütz.) Trevis., 16
P. monetarum Reinsch, 160
P. mucosus (Kütz.) Rabenh., 163
P. murorum (Grev.) Menegh., 164
P. nimbatu Wildem., 160
P. nudus (Kütz.) Rabenh., 77
P. pachydermus Lagerh., 160 (fig. 338)
P. pachydermus f. *stipitatus* W. & G. S. West, 160
P. palustris (Kütz.) Trevis., 163
P. persicinus (Dies.) Rabenh., 163
P. pulcher Kirchn., 160
P. pulcher (Flot.) Trevis., 121
P. pulvereus Wood, 67
P. regularis Art., 160
P. roseo-persicinus (Kütz.) Rabenh., 163
P. roseus (Menegh.) Rabenh., 163
P. rufescens Bréb., 78
P. rufescens var. *sanguineus* W. & G. S. West, 160
P. seriatus Wood, 160
P. simplex Art., 160
P. stercorarius Berk., 164
P. superbus Cienk., 160
P. tectorum (Kütz.) Trevis., 164
P. tectorum f. *antarcticus* Wille, 160
P. thermalis Menegh., 70
P. turgidus (Kütz.) Trevis., 70
P. vestitus Reinsch, 160
P. vestitus f. *chlorophyllaceus* Lagerh., 160
P. viridis (Ag.) Rabenh., 164
P. vulgaris (Grev.) Menegh., 145
P. vulgaris f. *cohaerens* Wittr., 160
P. vulgaris var. *cohaerens* Wittr., 160
P. vulgaris f. *glomeratus* Hansg., 160 (fig. 339)
P. vulgaris β *minor* (Kütz.) Kirchn., 163
P. vulgaris f. *minor* Rabenh., 160
P. vulgaris var. *minor* (Kütz.) Kirchn., 163
P. vulgaris f. *thermalis* (Menegh.) Bréb., 70
Pluto Copel., 161
P. caldarius (Tild.) Copel., 161
Podocapsa Erceg., 102
P. pedicellatum Erceg., 104
Polycoccus Kütz., 160
P. lucidus Roem., 160
P. marginatus Kütz., 158
P. papillosus Kütz., 126
P. punctiformis Kütz., 160
Polycystis Kütz., 34
Polycystis Lév., 34
Polycystis sect. *Anacystis* (Menegh.) Hansg., 34
Polycystis sect. *Clathrocystis* (Henfr.) Hansg., 34
Polycystis *aeruginosa* Kütz., 36
P. aeruginosa var. *major* Wittr., 36 (fig. 7)
P. amethystina Filársz., 51
P. clarionensis Setch. & Gardn., 104
P. elabens (Bréb.) Kütz., 28
P. elabens var. *ichthyoblabe* (Kütz.) Hansg., 36
P. elongata W. & G. S. West, 42
P. firma (Kütz.) Rabenh., 66
P. flos-aquae Wittr., 36 (fig. 4)
P. flos-aquae f. *autumnalis* Wittr., 36

POLYCYSTIS

- P. flos-aquae* var. *prasina* Witr., 36
- P. flos-aquae* var. *scripta* (Richt.) Hansg., 36
- P. fuscolutea* Hansg., 119
- P. glauca* (Wolle) Dr. & Daily, 66
- P. ichthyoblabe* Kütz., 36
- P. ichthyoblabe* b. *purpurascens* A. Br., 161
- P. incerta* Lemm., 42
- P. insignis* Beck, 36 (fig. 10)
- P. litoralis* Hansg., 17
- P. marginata* (Menegh.) Richt., 46
- P. marginata* var. *minor* Hansg., 160
- P. ochracea* Brand, 36 (fig. 3)
- P. Packardii* Farl., 28 (fig. 164)
- P. pallida* Lemm., 67
- P. pallida* (Kütz.) Thur., 16
- P. piscinalis* Brügg., 18
- P. piscinalis* var. *Microcystis* Brügg., 18
- P. prasina* Witr., 36 (fig. 6)
- P. pulvereae* (Wood) Wolle, 67
- P. purpurascens* A. Br., 160
- P. reticulata* Lemm., 43
- P. scripta* Richt., 36 (fig. 2)
- P. stagnalis* Lemm., 67
- P. violacea* Itzigs., 160 (fig. 352)
- P. viridis* A. Br., 36
- Polyedrium trigonum* var. *setigerum* (Arch.) Schröd., 166
- Porphyridium* Näg., 167
- P. aerugineum* Geitl., 161
- P. cruentum* (Sm. & Sow.) Näg., 167
- P. cruentum* β *Wittrockii* (Richt.) Hansg., 161
- P. magnificum* Wood, 161
- P. Schinzii* Schmidle, 161
- P. sordidum* Geitl., 161
- P. Wittrockii* Richt., 161
- Prasiola Gardneri* Coll., 90 (fig. 141)
- Priestleya* Meyen, 144
- P. botryoides* (L.) Meyen, 145
- Pringsheimia scutata* f. *Cladophorae* Tild., 112
- Protococcus* Ag., 167
- P. affinis* Dick., 140
- P. angulosus* Corda, 161
- P. annulatus* Pasch., 161
- P. antarcticus* (W. & G. S. West) G. S. West, 159
- P. ater* (Ach.) Kütz., 51
- P. atlanticus* Mont., 161
- P. atrovirens* Corda, 141
- P. aurantiacus* Wallr., 162
- P. aurantio-fuscus* Kütz., 161
- P. aureo-viridis* Kütz., 161
- P. aureus* Kütz., 161
- P. bacillaris* Näg., 161
- P. bituminosus* (Bory) Kütz., 137
- P. botryoides* (Kütz.) Kirchn., 192
- P. botryoides* Kütz., 161
- P. botryoides* f. *caldarius* Tild., 161
- P. botryoides* var. *nidulans* Hansg., 162 (fig. 331)
- P. bruneus* Kütz., 162 (fig. 323)
- P. brunneus* Kütz., 162
- P. caldiorum* Magn., 162 (fig. 325)
- P. carneus* Kütz., 119
- P. chalybeus* Kütz., 70
- P. Chlamidomonas* Kütz., 162 (fig. 327)
- P. chnaumaticus* Kütz., 162 (fig. 330)
- P. cinnamomeus* (Menegh.) Kütz., 159
- P. Clementii* Menegh., 162
- P. cobaltianus* (Link) Rabenh., 153
- P. coccoma* Kütz., 162
- P. cohaerens* Bréb., Kütz., 78
- P. communis* Kütz., 145
- P. communis* α *leprarius* Kütz., 192
- P. communis* β *Pleurococcus* Kütz., 145
- P. crassus* Kütz., 162 (fig. 334)
- P. crepidinum* Thur., 103 (fig. 186)
- P. crustaceus* Kütz., 162
- P. dimidiatus* Kütz., 70
- P. dissectus* Kütz., 139
- P. dissectus* a. *articulatus* Suring., 139
- P. dissectus* var. *cuneatus* Suring., 162
- P. ellipticus* (Menegh.) Kütz., 159
- P. elongatus* Näg., 28
- P. expallens* (Link) Rabenh., 147
- P. Felisii* Menegh., 162 (fig. 332)
- P. frigidus* (W. & G. S. West) G. S. West, 159
- P. frutulosus* (Harv.) de Toni, 191
- P. fuliginosus* Lenorm., 152
- P. fuscatus* G. S. West, 162
- P. fusco-ater* Kütz., 46 (fig. 46)
- P. gigas* Kütz., 162
- P. glaucus* Crouan, 104
- P. globosus* Näg., 162 (fig. 333)
- P. glomeratus* Ag., 162
- P. Goetzei* Schmidle, 162
- P. Grevillei* (Ag.) Crouan, 152
- P. grumosus* Richt., 162
- P. haematodes* Kütz., 47 (fig. 88)
- P. immanis* Mont., 162
- P. infusionum* (Schränk) Kirchn., 153
- P. infusionum* var. *Roemerianus* (Kütz.) Hansg., 154
- P. julianus* Kütz., 16
- P. julianus* (Menegh.) Kütz., 119
- P. kermesinus* (Wrang.) Ag., 153
- P. Kuetzingianus* Trevis., 16
- P. Kuetzingii* G. S. West, 163
- P. lacteus* (L.) Kütz., 145
- P. lilacinus* Rabenh., 162 (fig. 326)
- P. macrococcus* Kütz., 162
- P. magma* Bréb., 46
- P. marinus* Kütz., 162
- P. marinus* f. *Foslieanus* Hansg., 162
- P. marinus* var. *Foslieanus* Hansg., 163
- P. marinus* var. *virens* Hansg., 163 (fig. 328)
- P. membraninus* Menegh., 77
- P. Meneghinii* Kütz., 153
- P. miniatus* Kütz., 163
- P. minor* Kütz., 163 (fig. 324)
- P. minor* γ *infusionum* (Schränk) Kütz., 153
- P. minor* α *leprosus* Kütz., 163
- P. minor* var. *leprosus* Kütz., 163
- P. minor* β *mucosus* Kütz., 163 (fig. 321)
- P. minor* var. *mucosus* Kütz., 163
- P. minutus* Kütz., 16 (fig. 145)
- P. minutus* var. *caerulescens* Bréb., 16
- P. Monas* β *aquaticus* Kütz., 163
- P. Monas* var. *aquaticus* Kütz., 163
- P. Monas* β *oblongus* Flot., 163
- P. moniliformis* Flot., 163
- P. Montagnei* (Menegh.) Kütz., 146

PROTOCOCCUS

- P. mucosus* Kütz., 163
P. natans Ag., 163
P. nebulosus Kütz., 163
P. nivalis (Bauer) Ag., 167
P. nudus Kütz., 77
P. Orsinii (Menegh.) Kütz., 152
P. pachydermus G. S. West, 160
P. pallidus Näg., 78 (fig. 129)
P. palustris Kütz., 163
P. pellucidus Näg., 47
P. persicinus Dies., 163
P. pluvialis (Flot.) Kütz., 152
P. pluvialis β aquaticus Kütz., 163
P. pluvialis α leprosus Kütz., 152
P. protogenitus (Bias.) Hansg., 154
P. protogenitus var. minor Forti, 154
P. pulcher (Flot.) Kütz., 121
P. pygmaeus Kütz., 46 (fig. 27)
P. roseo-persicinus Kütz., 163
P. roseus Menegh., 163
P. roseus (Schreb.) Corda, 153
P. rubens (Hoffm.) Kütz., 154
P. rubiginosus Suring., 163
P. rufescens Kütz., 78
P. rupestris (Lyngb.) Corda, 16
P. sabulosus Menegh., 163
P. salinus Dunal, 164
P. sanguineus (Ag.) Bréb. & God., 45
P. stercorarius Berk., 164
P. tectorum Kütz., 164
P. thermalis (Menegh.) Kütz., 70
P. turgidus Kütz., 70 (fig. 100)
P. turgidus α chalybeus Kütz., 70
P. turgidus β fuscescens Kütz., 70 (fig. 100)
P. umbrinus Kütz., 155
P. variabilis Hansg., 164 (fig. 322)
P. violasceus Corda, 51
P. viridis Ag., 164
P. viridis var. angulosus (Corda) Wolle, 161
P. viridis var. botryoides (Kütz.) Wolle, 192
P. viridis var. dissectus (Kütz.) Wolle, 139
P. viridis var. gigas (Kütz.) Wolle, 162
P. viridis var. humicola (Näg.) Wolle, 149
P. viridis var. infusionum (Schrank) Wolle, 153
P. viridis var. insignis Hansg., 164 (fig. 329)
P. viridis var. miniatus (Leibl.) Wolle, 157
P. viridis β pulcher (Kirchn.) Hansg., 160
P. viridis var. pulcher (Kirchn.) Hansg., 160
P. viridis var. Wimmeri (Hilse) Wolle, 164
P. vulgaris (Grev.) Kütz., 145
P. vulgaris β Pleurococcus Kütz., 145
P. vulgaris var. Pleurococcus Kütz., 145
P. Wimmeri Hilse, 164
Protosiphon Klebs, 161
P. botryoides (Kütz.) Klebs, 161
P. CINNAMOMEUS (Menegh.) Dr. & Daily, 159
Protosphaeria Turp., 164
P. atrovirens (Corda) Trevis., 141
P. aurea (Kütz.) Trevis., 161
P. Chlamidomonas (Kütz.) Trevis., 162
P. Clementii (Menegh.) Trevis., 162
P. coccoma (Kütz.) Trevis., 162
P. dalmatica (Zanard.) Trevis., 104
P. Grevillei (Ag.) Trevis., 152
P. macrococca (Kütz.) Trevis., 162
P. Montagnei (Menegh.) Trevis., 146
P. Orsinii (Menegh.) Trevis., 152
P. pluvialis (Flot.) Trevis., 152
P. sabulosa (Menegh.) Trevis., 163
P. simplex Turp., 164
P. violascea (Corda) Trevis., 51
P. viridis (Lam.) Trevis., 145
Pseudocapsa Erceg., 102
P. dubia Erceg., 122
Pseudoholopedia (Rypp.) Elenk., 86
P. convoluta (Bréb.) Elenk., 89
P. convoluta var. subsalina Proschk.-Lavr., 90
Pseudoncobyrsea Geidl., 156
P. fluminensis Fritsch, 121
P. lacustris (Schröt. & Kirchn.) Geidl., 156
P. siderophila (Naum.) Geidl., 158
Radaisia Sauvag., 101
R. clavata Setch. & Gardn., 112
R. confluens Gardn., 120 (fig. 228)
R. Cornuana Sauvag., 120
R. epiphytica Gardn., 128
R. epiphytica Setch. & Gardn., 112
R. gigas Geidl., 121
R. Gomontiana Sauvag., 112
R. Laminariae Setch. & Gardn., 112 (fig. 204)
R. pusilla Weber-v. B., 113
R. subimmersa Setch. & Gardn., 112 (fig. 215)
R. violacea Frémy, 122
R. Willei Gardn., 120
Radaisiella Geidl., 101
R. subimmersa (Setch. & Gardn.) Geidl., 112
Radiocystis Skuja, 35
R. geminata Skuja, 67
Rhabdoderma Schmidle & Lauterb., 13
R. Cavanillesianum Gonz., 164
R. Gorskii Wolosz., 32
R. Gorskii var. spirale Lundb., 32
R. irregulare (Naum.) Geidl., 32
R. lineare Schmidle & Lauterb., 32
R. lineare f. compositum (G. M. Sm.) Hollerb., 29
R. lineare f. spirale (Wolosz.) Hollerb., 164
R. lineare var. spirale Wolosz., 164
R. minimum Lemm., 164
R. salinum Tut., 164
R. sigmoideum Moore & Cart., 32
R. sigmoideum f. minus Moore & Cart., 32
R. vermiculare Fott, 32
Rhabdogloea Schröd., 13
R. ellipsoidea Schröd., 32
Rhodocapsa violacea (Kütz.) Hansg., 47
R. violacea β compacta (Kütz.) Richt., 47
Rhodococcus Hansg., 137
Rhodococcus sect. *Porphyridium* (Näg.) Hansg., 167
Rhodococcus sect. *Rhodocapsa* Hansg., 34
Rhodococcus caldariiorm Hansg., 140 (fig. 257)
R. Hansgirgii Schmidle, 120 (fig. 229)
R. insignis Schmidle, 70 (fig. 101)
R. intermedius Bargagl.-Petr., 164
Rhodoplax Schmidle & Wellh., 161
R. Schinzii (Schmidle) Schmidle & Wellh., 161
Rhodospaerium diffuile Nads., 164
Rhodospora Geidl., 164

RHODOSPORAE

- R. sordida* Geitl., 164
Rhodostichus Geitl. & Pasch., 164
R. expansus Geitl. & Pasch., 164
Rivularia foetida (Vill.) Lam. & DC., 148
Rosaria Carm., 164
Rosaria Cart., 164
R. clandestina Skuja, 164
R. ramosa Cart., 164
Sarcina Goods., 165
S. hyalina (Ehrenb.) Wint., 151
S. littoralis (Oerst.) Wint., 150
S. punctata Meyen, 87
S. Reitenbachii (Casp.) Wint., 154
S. renis Hepw., 164
S. thermalis Kütz., 89
S. urinae Rossm., 165
S. ventriculii Goods., 165 (fig. 353)
S. vesicae Rossm., 165
S. Welckeri Rossm., 165
Sarcoderma Ehrenb., 165
S. sanguineum Ehrenb., 165
Schizochlamys aurantia (Ag.) Dr. & Daily, 155
Schizonema reticulatum Ag., 151
Schmidlea Lauterb., 143
S. luteola (Schmidle) Lauterb., 143
Schrammia Dang., 165
S. barbata Dang., 165
Scopulonema Erceg., 102
S. aurantiacum Geitl., 122
S. brevissimum Erceg., 104
S. concharum (Hansg.) Geitl., 120
S. Hansgirgianum Erceg., 104
S. Hansgirgianum f. roseum Erceg., 104
S. minus (Hansg.) Geitl., 120
S. minutum Geitl., 105
S. mucosum Erceg., 104
S. parenchymaticum Geitl., 159
S. polonicum (Racib.) Geitl., 120
Scopulonemataceae Erceg., 100
Scythymenia Ag., 167
S. rupestris (Sm. & Sow.) Ag., 167
Siderocapsa major f. chromophila Naum., 165
S. major f. chromophila Naum., 165
Siderothece Naum., 165
S. major Naum., 165
S. minor Naum., 165
Siphononema Geitl., 101
S. polonicum (Racib.) Geitl., 120
Siphononemataceae Geitl., 100
Snowella Elenk., 93
S. rosea (Snow) Elenk., 97
Solentia Erceg., 102
S. achromatica Erceg., 105
S. foveolarum Erceg., 104
S. intricata Erceg., 104
S. stratos Erceg., 104
Sorochloris vinosa Kuff., 165
Sorospora Hass., 34
S. grumosa (Carm.) Hass., 138
S. montana (Lightf.) Hass., 45
S. Ralfsii (Harv.) Hass., 46
S. virescens Hass., 165
Sphaenosiphon Reinsch, 101
S. aquae-dulcis Reinsch, 128
S. cuspidatus Reinsch, 111
S. incrustans Reinsch, 111
S. Leibleinae Reinsch, 111
S. minimus Reinsch, 165
S. olivaceus Reinsch, 111
S. prasinus Reinsch, 111
S. roseus Reinsch, 111
S. smaragdinus Reinsch, 111
S. solediformis Reinsch, 165
Sphaerastrum aponinum (Kütz.) Trevis., 191
S. cuneatum Kütz., 98
S. pictum (Turp.) Trevis., 142
Sphaerella Sommerf., 144
S. atlantica (Mont.) Lemm., 161
S. botryoides (L.) Sommerf., 145
S. nivalis (Bauer) Sommerf., 167
S. Wrangelii Sommerf., 153
Sphaerodictyon Geitl., 35
S. reticulatum (Lemm.) Geitl., 43
Sphaerogonium Rostaf., 101
S. amethystinum Rostaf., 129
S. curvatum (Nordst.) Rostaf., 128
S. fuscum Rostaf., 126
S. gracile Rostaf., 165
S. incrustans (Grun.) Rostaf., 127
S. minutum Rostaf., 129
S. nigrum Rostaf., 51
S. polonicum Rostaf., 121
S. subglobosum Rostaf., 121
Sphaerothermium Kütz., 154
S. aeruginosum Kütz., 36
S. roseum Kütz., 155
Spirillopsis Naum., 13
S. irregularis Naum., 32
Spirotaenia closteridia var. *elongata* Hansg., 140
S. muscicola de Bary, 141
Staurogenia Tetrapedia Kirchn., 165
Stichococcus Näg., 161
S. bacillaris Näg., 161
STICHOSIPHON Geitl., 135
S. filamentosus (Ghose) Geitl., 135
S. Hansgirgii Geitl., 165 (fig. 301)
S. indicus B. Rao, 135
S. regularis Geitl., 135
S. SANSIBARICUS (Hieron.) Dr. & Daily, 135
(FIG. 253, 254)
Stilocapsa Ley, 137
S. sinica Ley, 141
Synechococcus Näg., 13
Synechococcus subgen. *Eusynechococcus* Elenk., 13
Synechococcus subgen. *Synechocystis* (Saugv.) Elenk., 166
Synechococcus aeruginosus Näg., 14
S. aeruginosus f. angustior West, 14
S. aeruginosus f. crassior Lagerh., 14
S. aeruginosus var. *maximus* Lemm., 14
S. aeruginosus var. *salinus* Meyer, 15
S. ambiguus Skuja, 51 (fig. 67)
S. bigranulatus Skuja, 165
S. Bosshardii Skuja, 165
S. brunneolus Rabenh., 165
S. Cedrorum Sauvag., 29
S. crassus Arch., 14
S. crassus f. crassior Lagerh., 14
S. crassus var. *maximus* Lemm., 191
S. curtus Setch., 28 (fig. 167)

SYNECHOCOCCUS

- S. diachloros* Skuja, 15
S. elongatus Geidl., 165
S. elongatus Näg., 28
S. elongatus f. minor Wille, 29
S. endobioticus Elenk. & Hollerb., 94
S. euryphyes Beck-Mannag., 71
S. fuscus Zell., 165
S. Gaarderi Älv., 166
S. Geitleri J. de Toni, 165
S. grandis Playf., 15
S. intermedius Gardn., 166 (fig. 354)
S. kerguelensis Wille, 166
S. Koidzumii Yon., 29
S. major Schröt., 14
S. major f. crassior Lagerh., 14
S. major var. crassior Lagerh., 14 (fig. 143)
S. major f. crassus (Arch.) Elenk., 14
S. major f. maximus Lemm., 14
S. major var. maximus Lemm., 14
S. marinus Erceg., 104
S. minutus West, 32
S. parvulus Näg., 51 (fig. 90A)
S. parvus Mig., 28
S. racemosus Wolle, 32
S. roseo-persicinus Grun., 166
S. roseo-purpureus G. S. West, 14 (fig. 144)
S. salinus Frémy, 166
S. subsalsus Skuja, 29
S. ulcericola Rabenh., 166
S. violaceus Grun., 28
Synechocystis Sauvag., 166
S. aquatilis Sauvag., 166 (fig. 357)
S. crassa Woronich., 79
S. crassa var. major Geidl., 78
S. endobiotica Elenk. & Hollerb., 94
S. minuscula Woronich., 52
S. parvula Perf., 44
S. Pevalekii Erceg., 52
S. planctonica Proschk.-Lavr., 69
S. primigenia Gardn., 32
S. salina Wisl., 166
S. sallensis Skuja, 71
S. Willei Gardn., 69 (fig. 99)
Tetrachloris merismopedioides Skuja, 166
Tetracoccus Wildemanii Schmidle, 160
Tetraedron trigonum var. setigerum (Arch.) Lemm., 166
Tetrapedia Reinsch, 166
T. aversa W. & G. S. West, 166
T. crux-melitensis Reinsch, 166
T. crux-Michaeli Reinsch, 166
T. emarginata Schröd., 166
T. foliacea Turn., 166
T. glaucescens (Witt.) Boldt, 144
T. glaucescens var. papillifera Gutw., 144
T. gothica Reinsch, 166
T. Kirchneri Lemm., 165
T. morsa W. & G. S. West, 166
T. Penzigiana de Toni, 166
T. Reinschiana Arch., 166
T. setigera Arch., 166
T. trigona W. & G. S. West, 166
T. Wallichiana Turn., 166
Tetrapediaceae Elenk., 166
Tetrarcus Skuja, 14
T. Ilsteri Skuja, 32
Tetraspora didyma Liebm., 166
T. stereophysalis (Menegh.) Kütz., 155
Thamniastrum Reinsch, 93
T. cruciatum Reinsch, 97
Thaumaleocystis Trevis., 101
T. deusta (Menegh.) Trevis., 103
Thelephora sanguinea Pers., 166
Thiopedia Winogr., 166
T. rosea Winogr., 166
Tremella adnata L., 166
T. botryoides (L.) Schreb., 145
T. cruenta Sm. & Sow., 167
T. globosa Weis, 167
Treubaria setigera (Arch.) G. M. Sm., 166
Trichocystis Kütz., 158
T. gigantea Kütz., 158
Trichodicyron Kütz., 167
T. rupestre Kütz., 167
Trochiscia dimidiata Kütz., 70 (fig. 105)
T. Prasiola Menegh., 87
T. quadruplicata Menegh., 86
T. thermalis Menegh., 77
Tryponema Erceg., 102
T. endolithicum Erceg., 104
Tryporthallus Hook. f. & Harv., 156
T. anastomosans Hook. f. & Harv., 156
Tubercularia rosea (Schreb.) Pers., 153
Tubiella Hollerb., 167
T. Elenkinii Hollerb., 167
Tubiellaceae Elenk., 167
Ulothrix bacillaris (Näg.) For., 161
Ulva foetida (Vill.) Vauch., 148
U. granulata L., 167
U. montana Lightf., 45
U. protuberans Sm. & Sow., 137
U. rupestris Sm. & Sow., 167
Uredo nivalis Bauer, 167
Urococcus Hass., 137
U. Allmanii Hass., 139
U. cryptophilus Hass., 139
U. Hookerianus Berk. & Hass., 139
U. insignis Hass., 152
U. pallidus Lagerh., 140
Vanhoeffenia Wille, 137
V. antarctica Wille, 141
Vaucheria radicata Ag., 167
Woronichinia Elenk., 93
W. Naegeliana (Ung.) Elenk., 97
W. Naegeliana f. Lemmermannii (Elenk. & Hollerb.) Elenk., 94
W. Naegeliana var. Lemmermannii Elenk. & Hollerb., 94
Woronichiniaceae Elenk., 12
Xenococcaceae Erceg., 100
Xenococcus Thur., 101
X. acervatus Setch. & Gardn., 112 (fig. 212)
X. angulatus Setch. & Gardn., 113
X. britannicus Fritsch, 126
X. Chaetomorphae Setch. & Gardn., 112 (fig. 213)
X. chroococcoides Fritsch, 128 (fig. 242)
X. Cladophorae (Tild.) Setch. & Gardn., 112
X. concharum Hansg., 103 (fig. 192)
X. deformans Setch. & Gardn., 113

XENOCOCCUS

- X. endophyticus Setch. & Gardn., 113
- X. fluvialis (Lagerh.) Geitl., 128
- X. gaditanus Gonz., 105
- X. Gilkeyae Setch. & Gardn., 112
- X. gracilis Lemm., 129
- X. Kernerii Hansg., 128
- X. laysanensis Lemm., 113
- X. Lyngbyae Jao, 129
- X. minimus Geitl., 128 (fig. 241)
- X. minimus var. Starmachii Geitl., 128
- X. pulcher Hollenb., 113 (fig. 202)
- X. pyriformis Setch. & Gardn., 112
- X. rivularis (Hansg.) Geitl., 120
- X. Schousboei Thur., 111 (fig. 210)
- X. Schousboei var. pallidus Hansg., 167
(fig. 358)
- X. violaceus Anand, 113 (fig. 199)
- X. Willei Gardn., 128 (fig. 236)
- Zachariasia Lemm., 167
- Z. endophytica Lemm., 167

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